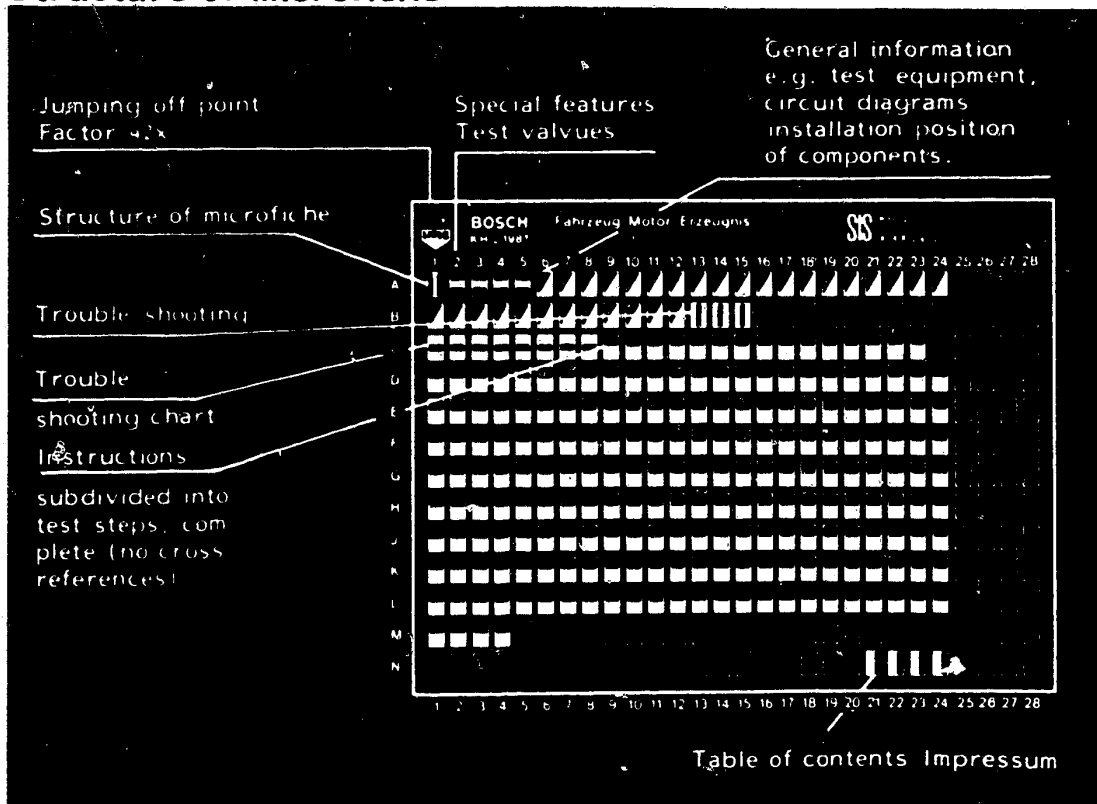


Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate)

E16	Product/component/test step
	Vehicle/engine

Coordinate

3. Limits of section



Beginning



Mid-section



End



One-page section

4. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C6

A1	Trouble-shooting program	
-----------	--------------------------	--

System: Electronic Diesel System

Special features: Electronically controlled exhaust-gas recirculation (EGR), low-idle-speed control (ELR), circulation control for soot burn-off filter

To make the detection of faults easier, the control unit is equipped with a self-diagnosis facility.

Whenever there are disturbances in the system, pulse sequences dependent upon the cause of the trouble are output after activation of the diagnosis.

Faulty components or line paths are determined by one flashing code assigned in each case.

Vehicle: Mercedes-Benz 300 DT (Type 124)
Mercedes-Benz-300 SDL (Type 126)
Year of manufacture: 09.1986
Engine: 603A, 3.0 l
kW 110, bhp: 148 US version
kW 107, bhp: 143 CAL. version

2. TEST SPECIFICATIONS

2.1 Idle speed

Governed	Ungoverned
610 - 650	530 - 610



2.2 Coordination, pump - engine (injection timing)

Idle speed	Setting dynamic	Setting static
610-650 1/min (encoding-plug position "4")	15° after TDC (15 ± 1° after TDC)	24° before TDC (24 ± 1° before TDC)

2.3 Nozzle-opening pressure

New nozzle 135 - 145 bar

Used nozzles

2.4 Pressure drop

Max. permissible 25 %

2.5 Charge-air pressure

at $n = 4000$ 1/min.

under load 0.75 - 0.95 bar



2.6 Exhaust back pressure (Cal. version only)

At $n = 4000$ 1/min., selection-lever position "P"
max. 2.5 bar

2.7 Permissible pressure drop of vacuum system

From 500 to 400 mbar in approx. 1 minute

2.8 Fuel delivery of fuel pump

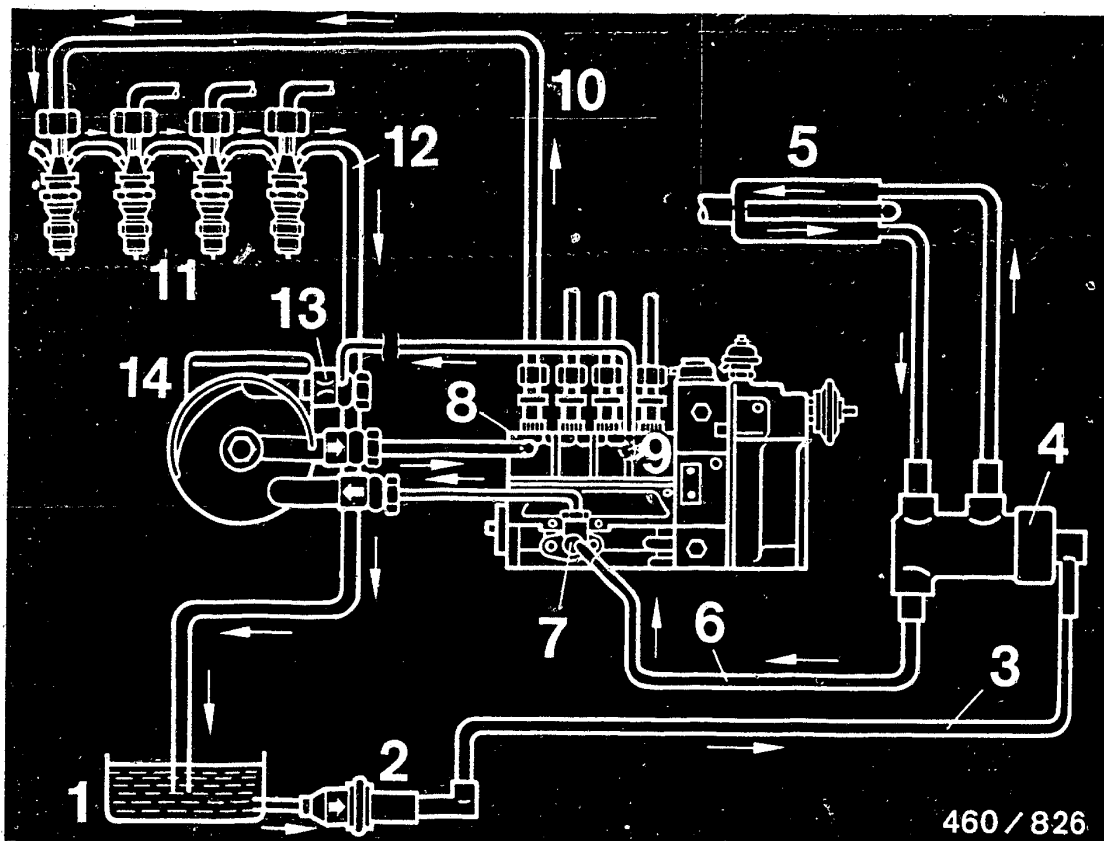
Min. 200 ml/30 s at starting-motor (cranking) speed
(stop lever pressed)



2.9 Tightening torques

Fuel-injection tubing	10 - 20 Nm
Injection-pump flange	20 - 25 Nm
Central fastening screw on timing device (left-hand thread)	40 - 50 Nm
Screw plug on governor for dynamic start-of-delivery adjustment	30 - 35 Nm
Nozzle-and-holder assembly	70 - 80 Nm
Delivery-valve holder	35 Nm
Nozzle-retaining nut	70 - 90 Nm
Fastening screw, fan	25 Nm
Rod-type glow plugs	20 Nm
Chain tensioner	80 Nm





- | | |
|---|---|
| 1 = Fuel tank | 8 = Injection pump |
| 2 = Fuel prefilter | 9 = Overflow valve with
1.5 mm \varnothing restriction |
| 3 = Inlet line - cold
fuel | 10 = Injection line -
cylinder 1 |
| 4 = Fuel thermostat | 11 = Injection nozzles |
| 5 = Heating flow pipe with
fuel heat exchanger | 12 = Leak-off line |
| 6 = Return line - pre-
heated fuel | 13 = Restriction bore
0.8 mm \varnothing |
| 7 = Supply pump | 14 = Fuel filter top part |

3. DIAGRAM OF LINES

3.1 Diagram of fuel lines

The fuel lines are connected in accordance with the above diagram. The fuel flows in the direction of the arrows.



Note on fuel preheating

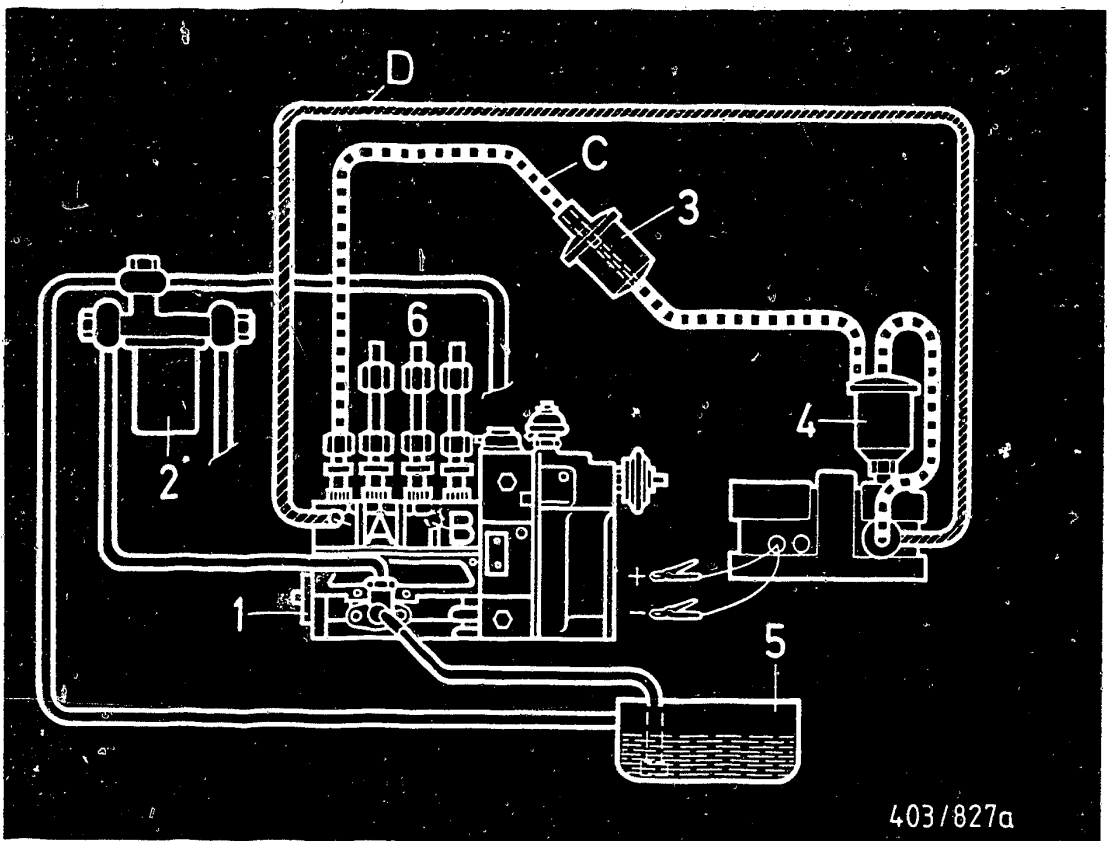
A fuel heat exchanger is installed in the inlet line to preheat the fuel. The fuel thermostat regulates the inlet quantity through the heat exchanger or directly to the supply pump on the injection pump.
Up to $+8^{\circ}\text{C}$ the entire fuel flow is directed through the fuel heat exchanger.

Between $+8^{\circ}\text{C}$ and $+25^{\circ}\text{C}$ the fuel is blended depending on temperature.

Above $+25^{\circ}\text{C}$ the inlet bore to the fuel heat exchanger is closed by the thermostat.

The fuel flows directly to the supply pump on the injection pump.





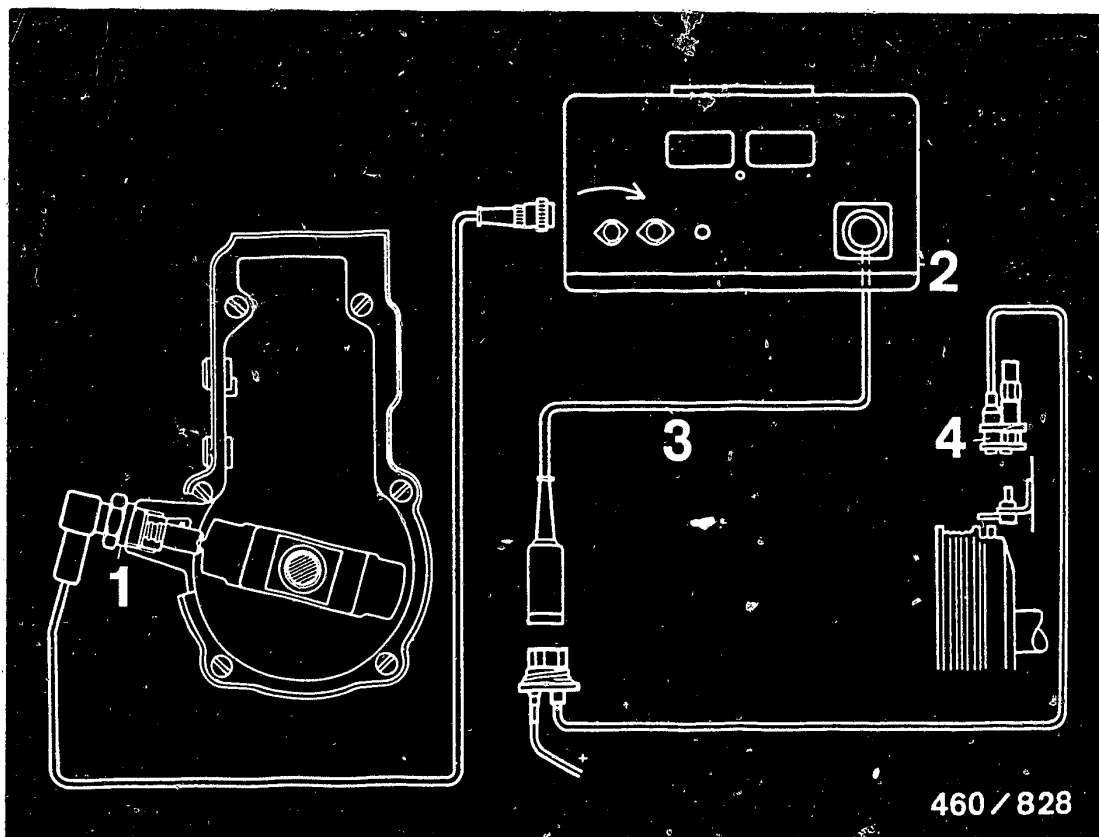
- 1 = Injection pump
- 2 = Fuel filter
- 3 = Sight glass
- 4 = Start-of-delivery setting device
- 5 = Fuel tank
- 6 = Pressure-limiting valves

- A = Inlet-union screw, fuel inlet from start-of-delivery setting device
- B = Seal fuel return line with screw plug.
- C = return line
- D = high-pressure line approx. 30 + 4. bar

3.2 Connection diagram for start-of-delivery adjustment (static)

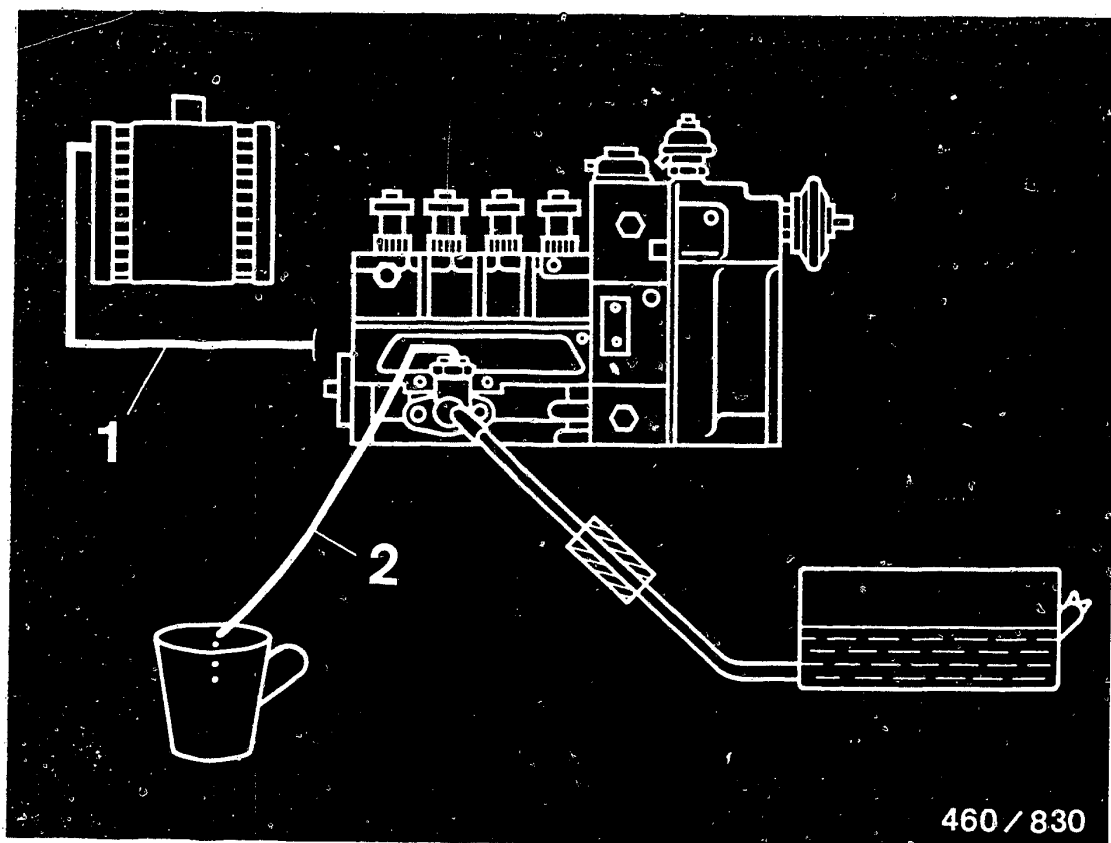
High pressure - overflow - method.





- 1 = Governor pulse generator
- 2 = Diesel engine tester ETD 019
- 3 = Adapter lead
- 4 = TDC pickup

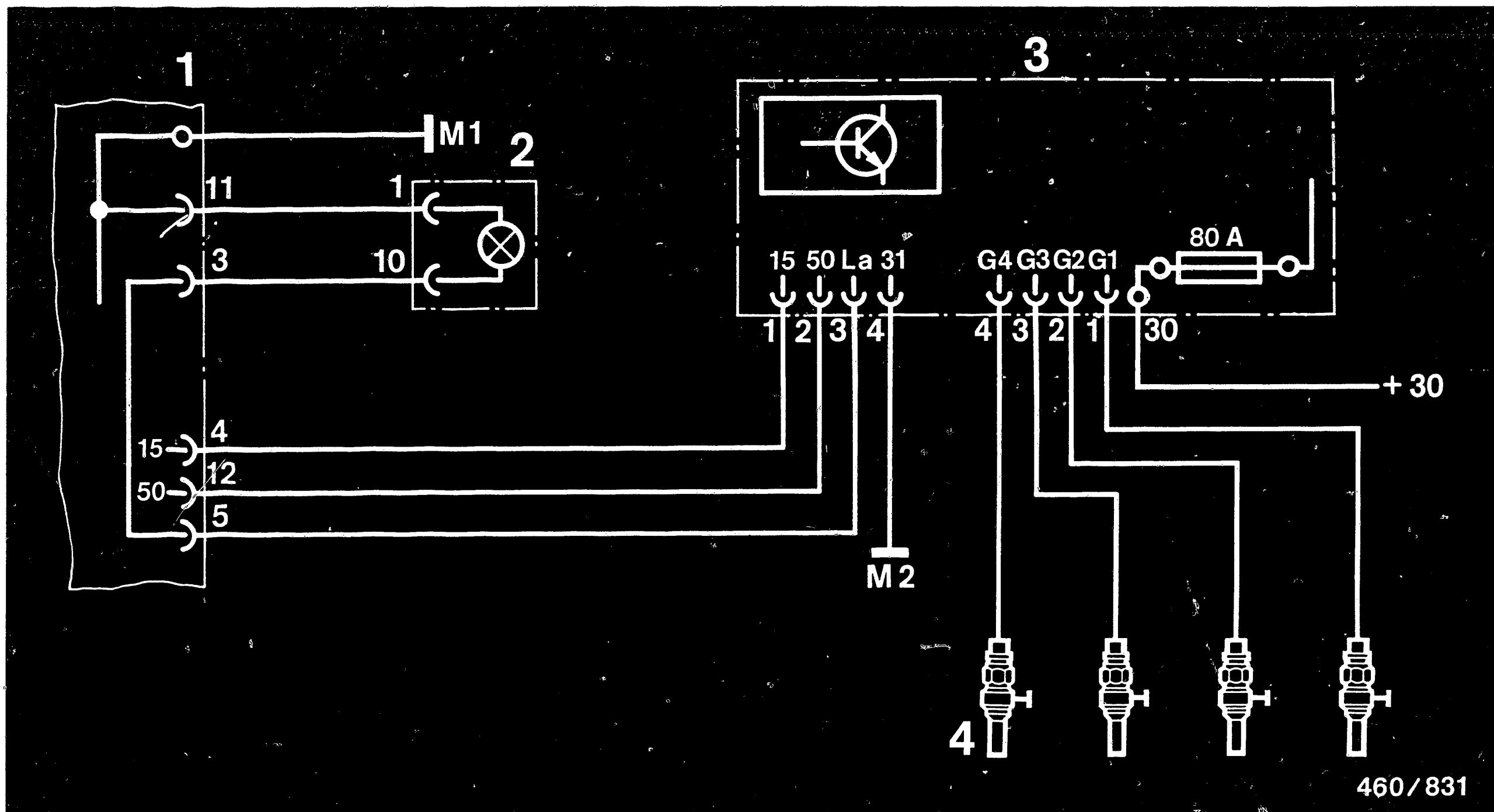
3.2.1 Connection diagram for dynamic start-of-delivery test



1 = Pressure line
2 = Test line

3.3 Connection diagram for testing of supply pump





- 1 = Central-electrics console
 2 = Glow-plug indicator in instrument cluster
 3 = Glow-duration unit
 4 = Sheathed-element glow plugs

- M1 = Main ground behind instrument cluster
 M2 = Ground front left (near lamp unit)

4. TERMINAL DIAGRAM FOR PREHEATING SYSTEM (valid for 4-, 5- and 6-cylinder pumps)

A11

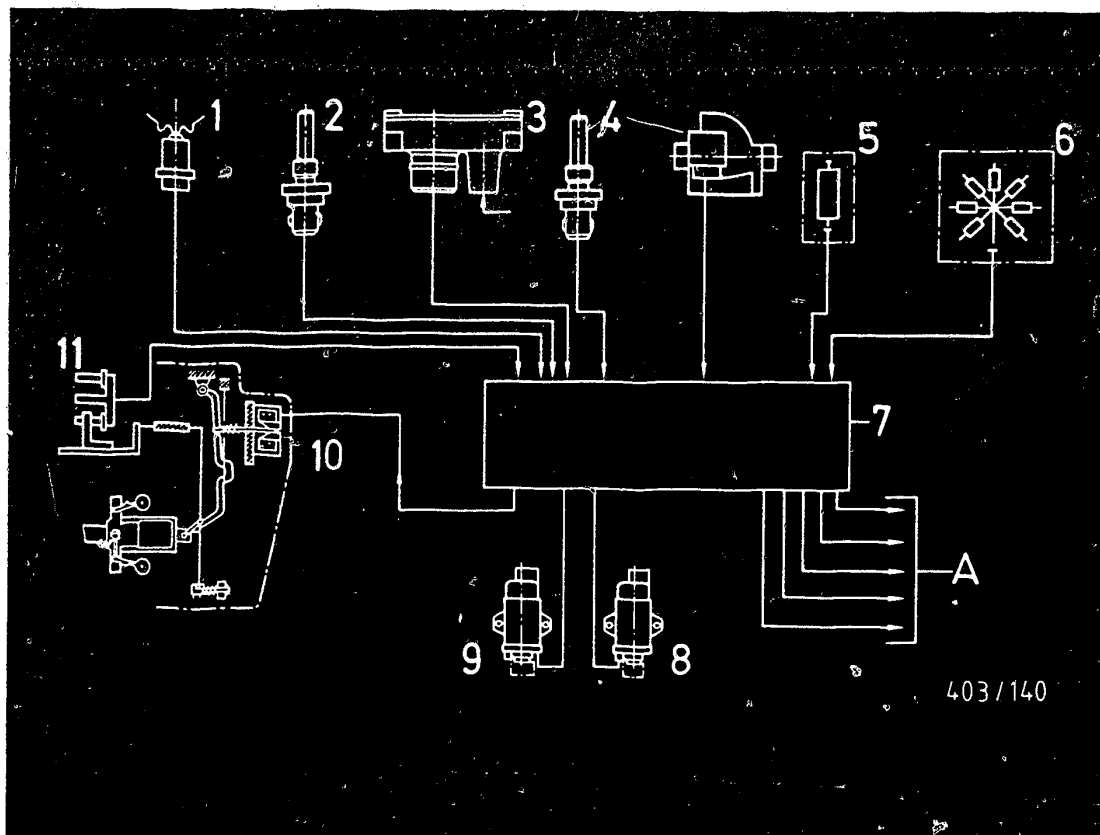
Terminal diagram - preheating system
 MB 124/126



A12

Terminal diagram - preheating system
 MB 124/126

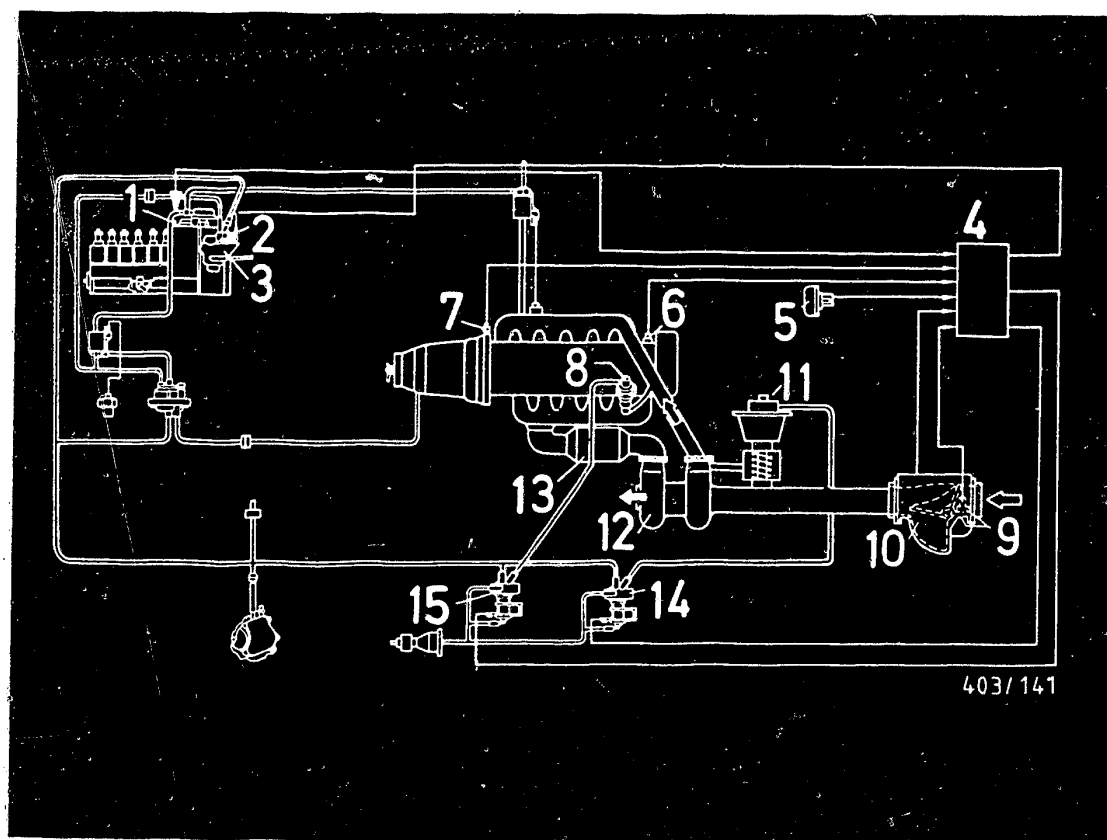




- 1 = Engine-speed sensor
- 2 = Coolant-temperature sensor
- 3 = Atmospheric-pressure sensor
- 4 = Air-flow sensor with air-temperature sensor
- 5 = Single trimming plug for exhaust-gas recirculation
- 6 = Trimming plug for idle speed
- 7 = Control unit
- 8 = Pressure transducer, circulation control
- 9 = Pressure transducer, exhaust-gas-recirculation valve
- 10 = Servo magnet
- 11 = Control-rod-travel sensor
- A = Test outputs

5. SYSTEM OVERVIEW - ELECTRONIC EXHAUST-GAS RECIRCULATION (EGR)



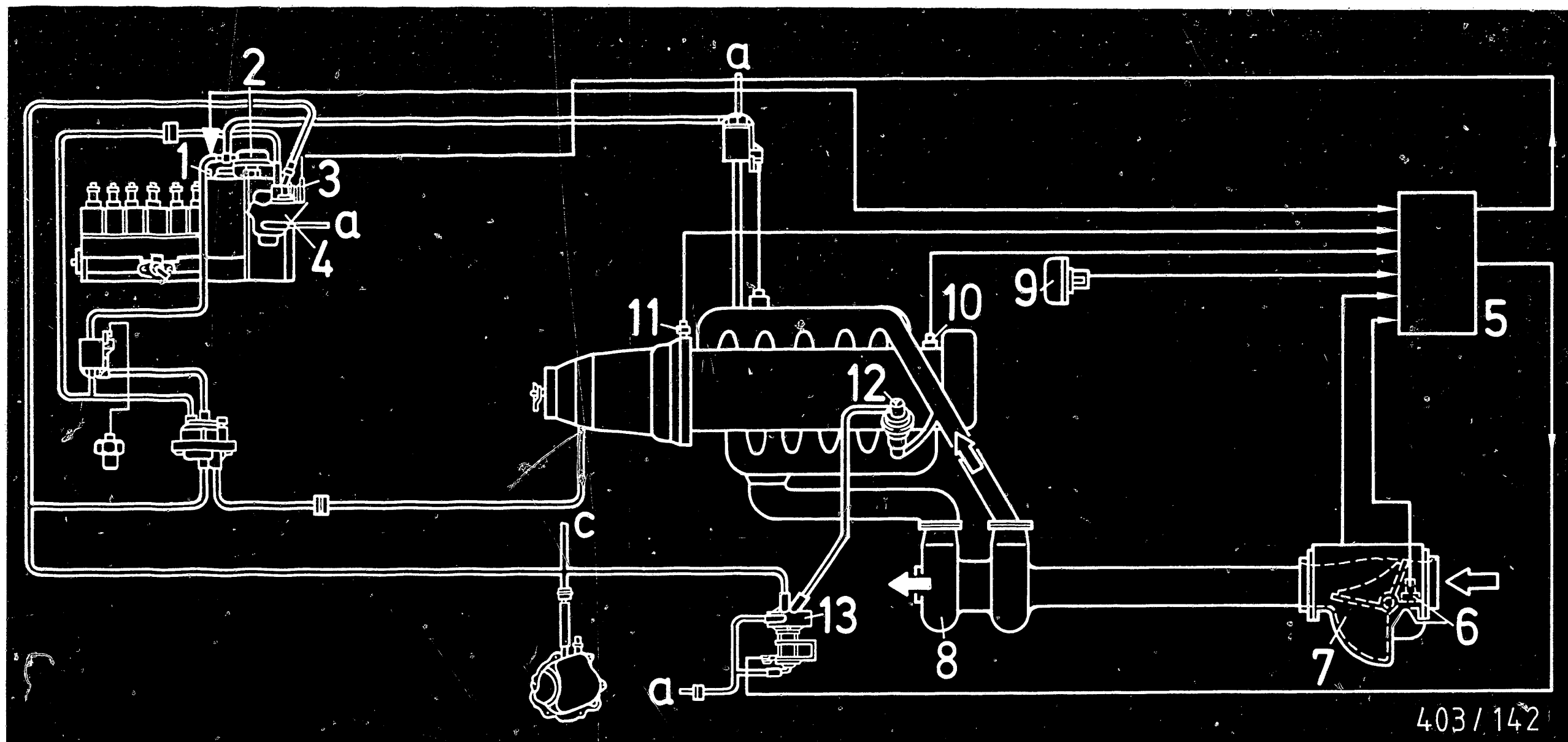


- 1 = Control-rod-travel sensor
- 2 = Servo magnet
- 3 = Vacuum-control valve
- 4 = Control unit
- 5 = Atmospheric-pressure sensor
- 6 = Coolant-temperature sensor
- 7 = Engine-speed sensor
- 8 = EGR valve
- 9 = Air-temperature sensor
- 10 = Air-flow sensor
- 11 = Recirculation valve
- 12 = Exhaust turbo-supercharger
- 13 = Soot burn-off filter
- 14 = Electropneumatic pressure transducer for circulation control
- 15 = Electropneumatic pressure transducer for EGR valve

6. DIAGRAMS OF ELECTROPNEUMATIC LINES

6.1 Diagram of lines - Type 126 CAL version





- 1 = Control-rod-travel sensor
- 2 = ALDA unit
- 3 = Servo magnet
- 4 = Pressure-control valve
- 5 = Control unit
- 6 = Air-temperature sensor

- 7 = Air-flow sensor
- 8 = Exhaust turbo-supercharger
- 9 = Atmospheric-pressure sensor
- 10 = Coolant-temperature sensor
- 11 = Engine-speed sensor
- 12 = Exhaust-gas-recirculation valve
- 13 = Pressure transducer, exhaust-gas recirculation

6.2 Diagram of lines - Type 124/126 US version

A15

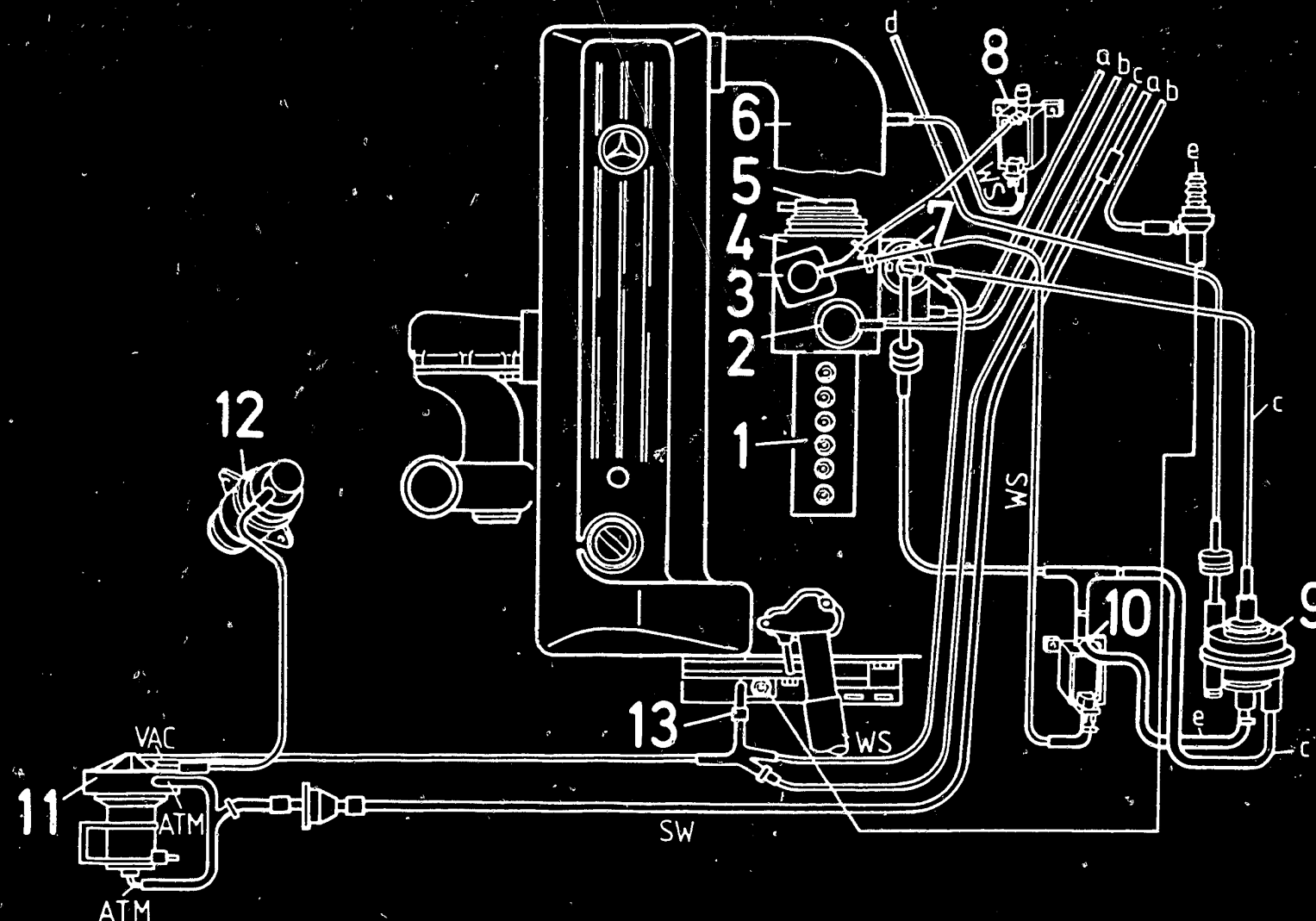
Diagram of electropneumatic lines
MB 124/126



A16

Diagram of electropneumatic lines
MB 124/126





403/143

- 1 = Injection pump
- 2 = Vacuum unit
- 3 = ALDA unit
- 4 = Governor
- 5 = Servo magnet
- 6 = Charge-air distribution pipe
- 7 = Vacuum-control valve

- 8 = Change-over valve, engine-overload protection
- 9 = Pressure converter
- 10 = Change-over valve, pressure converter for automatic transmission
- 11 = Pressure transducer, exhaust-gas-recirculation valve
- 12 = Exhaust-gas-recirculation valve
- 13 = Filter (vacuum pump)

- A = Ventilation to passenger compartment
- B = Vacuum to vacuum unit
- C = Vacuum from vacuum pump
- D = To vacuum unit automatic transmission
- E = Charge-air pressure from ALDA unit

7. DIAGRAMS OF VACUUM LINES

7.1 Routing of vacuum lines - Type 124, 126 US version

A17

Diagrams of vacuum lines

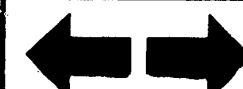
MB 124/126

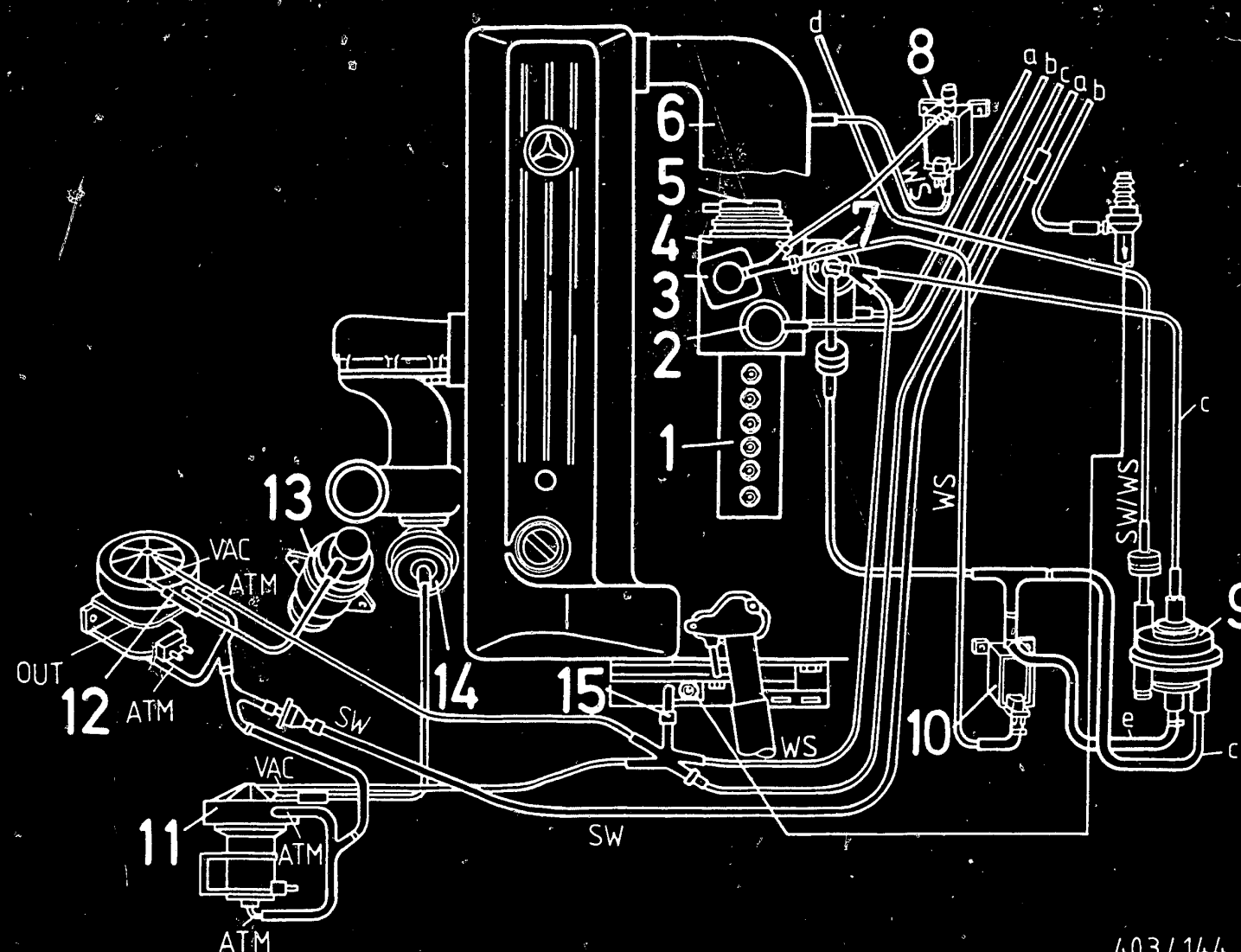


A18

Diagrams of vacuum lines

MB 124/126





403/144

- 1 = Injection pump
- 2 = Vacuum unit
- 3 = ALDA unit
- 4 = Governor
- 5 = Servo magnet
- 6 = Charge-air distribution pipe
- 7 = Vacuum-control valve

- 8 = Change-over valve, engine-overload protection
- 9 = Pressure converter
- 10 = Change-over valve, pressure converter for automatic transmission
- 11 = Pressure transducer, circulation valve
- 12 = Pressure transducer, exhaust-gas-recirculation valve
- 13 = Exhaust-gas-recirculation valve

- 14 = Circulation valve
- 15 = Filter (vacuum pump)
- A = Ventilation to passenger compartment
- B = Vacuum to vacuum unit
- C = Vacuum from vacuum pump
- D = To vacuum unit automatic transmission
- E = Charge-air pressure from ALDA unit

7.2 Routing of vacuum lines - Type 124, 126 CAL version

A19

Diagrams of vacuum lines

MB 124/126

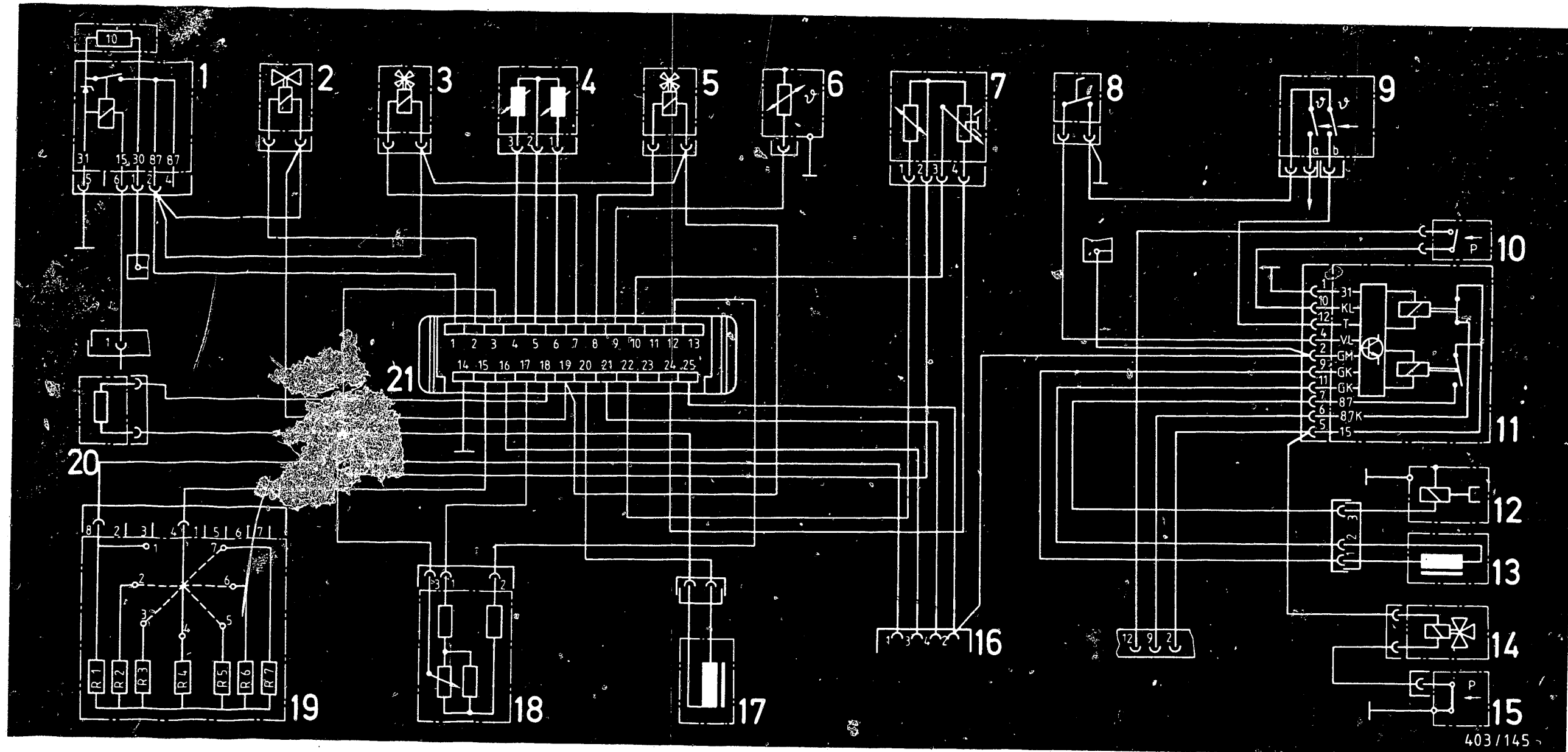


A20

Diagrams of vacuum lines

MB 124/126





403/145

- 1 = Overvoltage protection
- 2 = Servo magnet
- 3 = Pressure transducer, exhaust-gas-recirculation valve
- 4 = Control-rod-travel sensor
- 5 = Pressure transducer, circulation valve (CAL only)
- 6 = Coolant-temperature sensor
- 7 = Transmitter, air-flow sensor
- 8 = Microswitch, compressor cutoff

- 9 = Temperature switch 105-120°C
- 10 = Pressure switch, refrigerant compressor
- 11 = Control unit, refrigerant-compressor cutoff
- 12 = Electromagnetic clutch, refrigerant compressor
- 13 = Rotational-speed sensor, refrigerant compressor
- 14 = Change-over valve, engine-overload protection

- 15 = Switch, engine-overload protection
- 16 = Test coupling for diesel control system
- 17 = Rotational-speed sensor, starting-motor collar
- 18 = Atmospheric-pressure sensor
- 19 = Trimming plug, low-idle-speed control
- 20 = Trimming plug, exhaust-gas recirculation
- 21 = Control unit

8. ELECTRICAL CIRCUIT DIAGRAMS

8.1 Electrical circuit diagram - type 126 US and CAL versions

A21

Electrical circuit diagrams

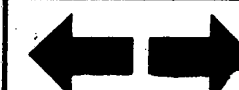
MB 124/126

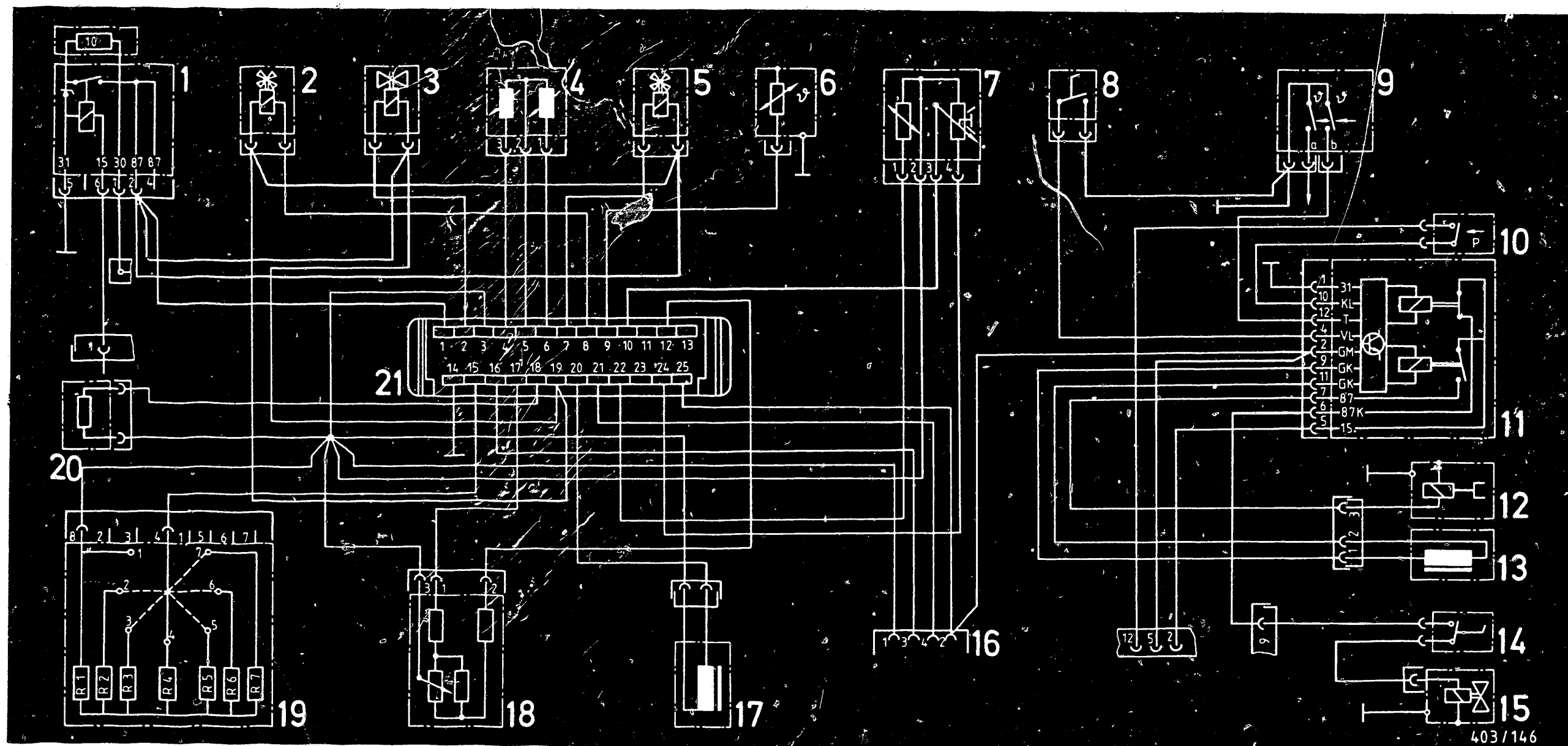


A22

Electrical circuit diagrams

MB 124/126





- 1 = Overvoltage protection
- 2 = Pressure transducer, circulation valve
- 3 = Servo magnet
- 4 = Control-rod-travel sensor
- 5 = Pressure transducer, exhaust-gas recirculation
- 6 = Coolant-temperature sensor
- 7 = Transmitter, air-flow sensor
- 8 = Microswitch, compressor cutoff

- 9 = Temperature switch 105-120°C
- 10 = Pressure switch, refrigerant compressor
- 11 = Control unit, refrigerant-compressor cutoff
- 12 = Electromagnetic clutch, refrigerant compressor
- 13 = Rotational-speed sensor, refrigerant compressor
- 14 = Kickdown switch

- 15 = Change-over valve, automatic transmission
- 16 = Test coupling for diesel control system
- 17 = Rotational-speed sensor, starting-motor collar
- 18 = Atmospheric-pressure sensor
- 19 = Trimming plug, low-idle-speed control
- 20 = Trimming plug, exhaust-gas recirculation
- 21 = Control unit

8.2 Electrical circuit diagram - Type 124 US and CAL versions

A23

Electrical circuit diagrams

MB 124/126



A24

Electrical circuit diagrams

MB 124/126



9. TEST EQUIPMENT AND TOOLS

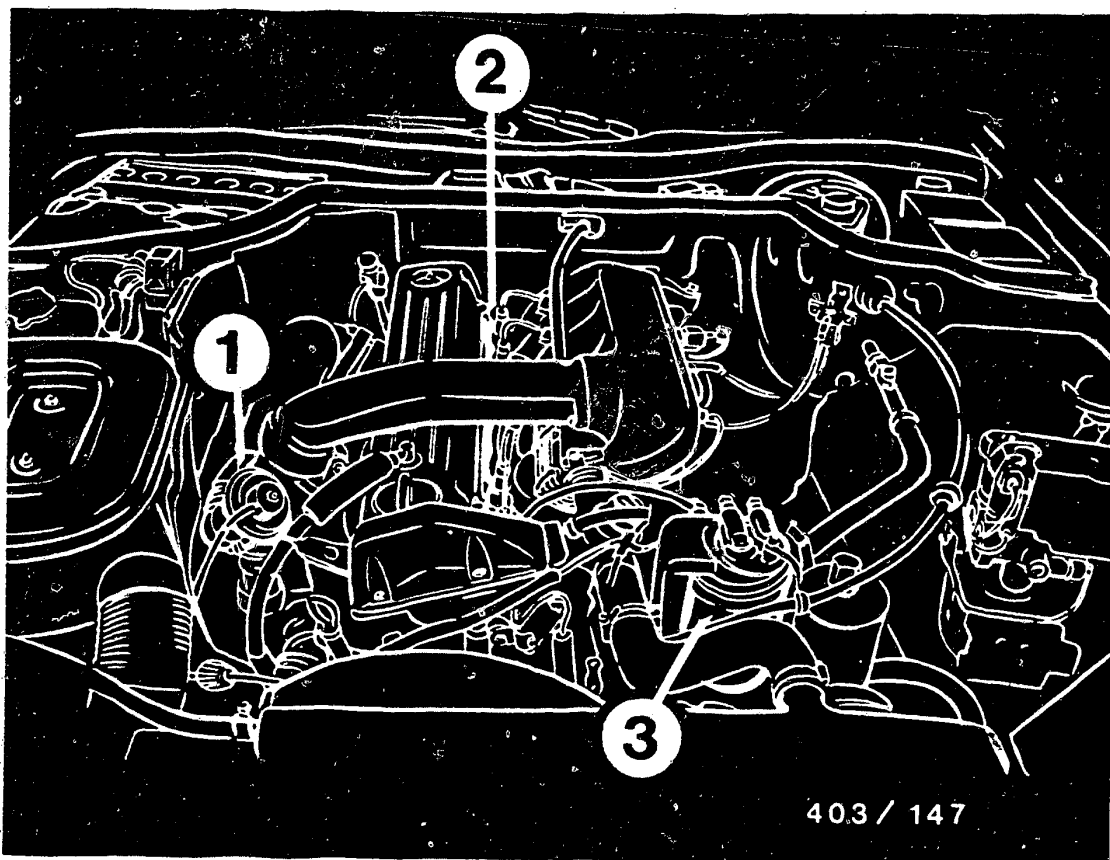
Designation	Part No.	Use
Nozzle tester	EFEP 60 H 0 681 200 502	Testing the injection nozzles
Compression tester	Commercially available	Testing the engine
Smokemeter	0 684 102 050	Smoke test
Accessories box with sampling pump	0 681 169 038 or 0 681 169 058	
Compression-loss tester	EFAW 210 A 0 681 001 901	Testing the engine compression
Vacuum hand primer "Mityvac"	Korinth Co. Ludwig-Kloos-Str. 21 D-6450 Hanau 7 (Steinheim)	Leakage test
Pressure-vacuum tester	ETT 007.01	Testing the vacuum cutoff
Port-closing setting device	KDEP - P 200	Coordination, pump - eng. (inj. timing), static
Connecting parts for KDEP - P 200	KDEP - P 200/50	Coordination, pump - eng. (inj. timing), static
Tachometer	Commercially available	Setting the engine speed
Special wrench for fuel-injection tubing	Hazet 329-2 SW (A/F) 14	Loosening the fuel-injection tubing



TEST EQUIPMENT AND TOOLS (Continued)

Designation	Part No.	Use
Puller	KDEP 1573	Removing the servo magnet
Diesel-engine tester with adapter lead Special accessory: governor-pulse generator	ETD 019.00 0 684 463 147 617 589 102 100 (DB Part No.)	Dynamic start-of-delivery test
Holding device	KDEP 1077	Locking the flyweight
Multimeter with digital indicator	Commercially available	Testing the preheating system
Test resistor 2.5 k Ω	102 589 056 300 (DB Part No.)	Temperature sensor
Test lead	KDZS 0004	Testing the diesel control system
Test lead	KDUM 0016	Testing the diesel control system
Evaluating unit for flash diagnosis	KDAW 9980	Activating and indicating the self-diagnosis





403 / 147

- 1 = Exhaust-gas-recirculation valve
- 2 = Injection nozzles
- 3 = Fuel filter

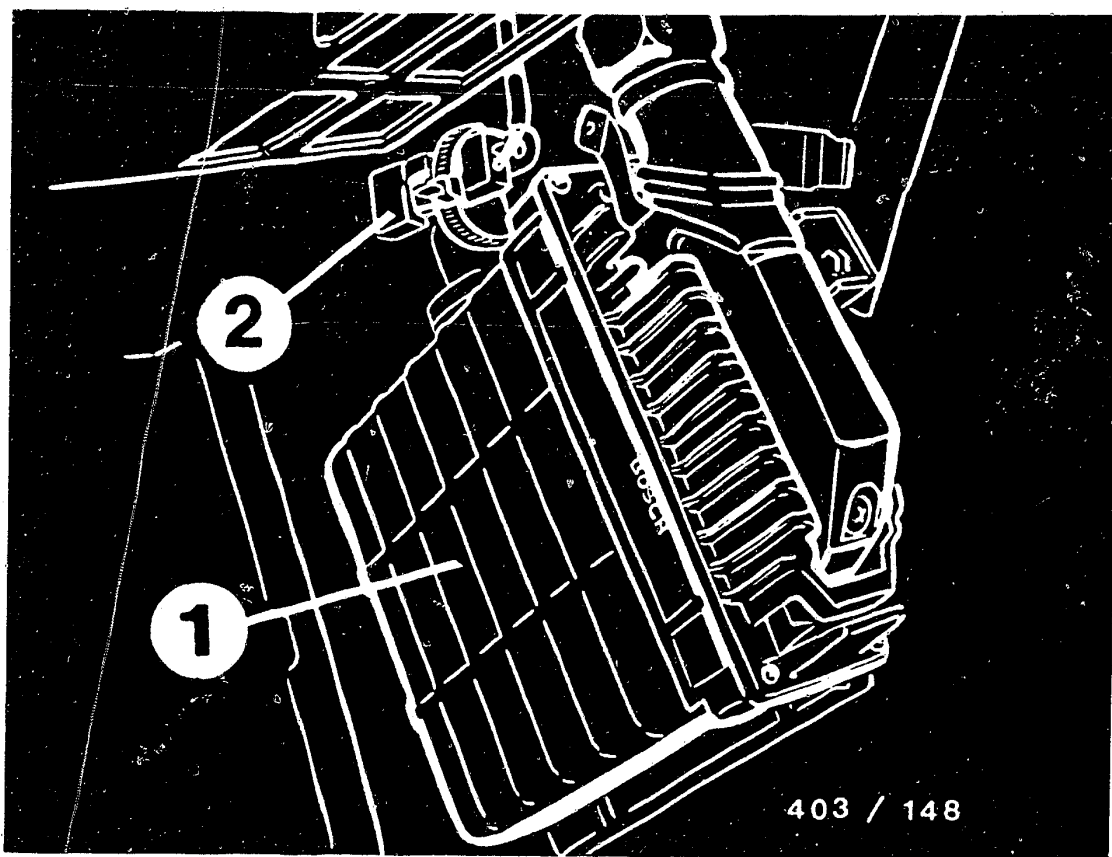
10. INSTALLATION POSITION OF COMPONENTS

B3

Installation position of components

MB 124/126





- 1 = Control unit
2 = Single trimming plug (EGR)

Type 126: footwell on the right behind the side panel (illustration).

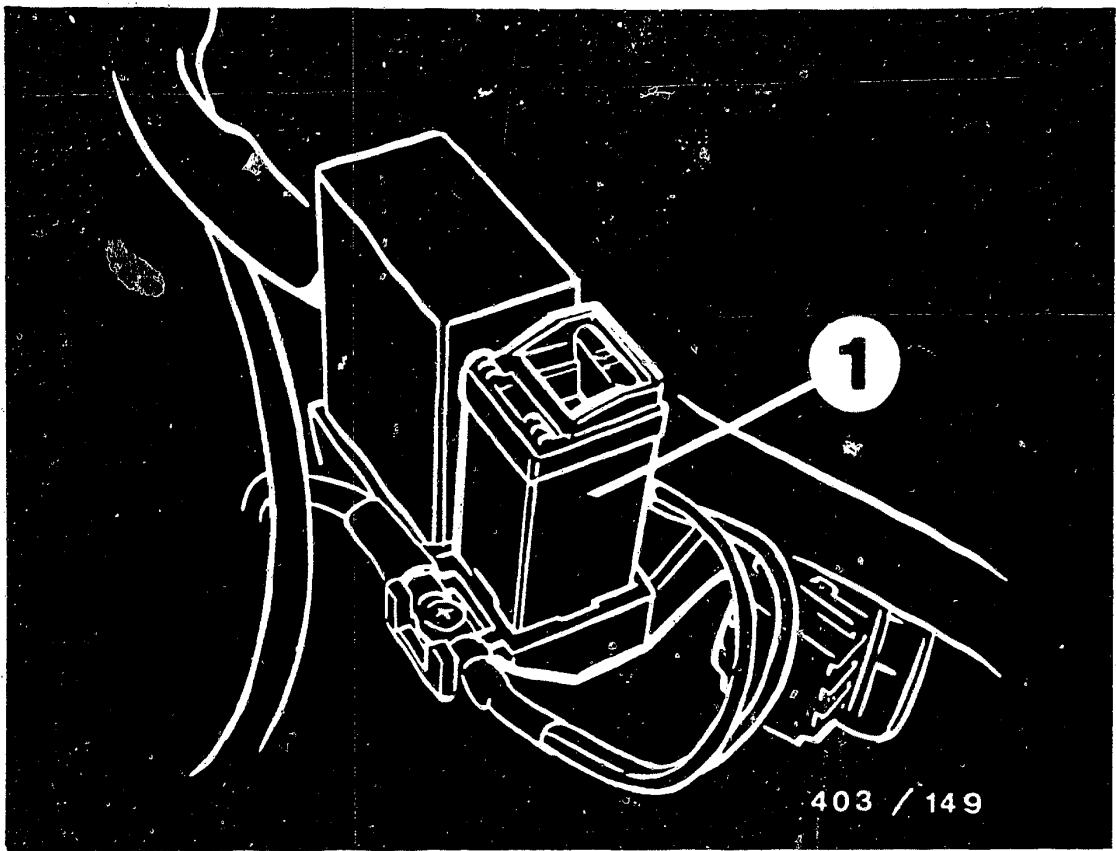
Type 124: behind the battery in the engine compartment.

B4

Installation position of components

MB 124/126





1 = Overvoltage protection

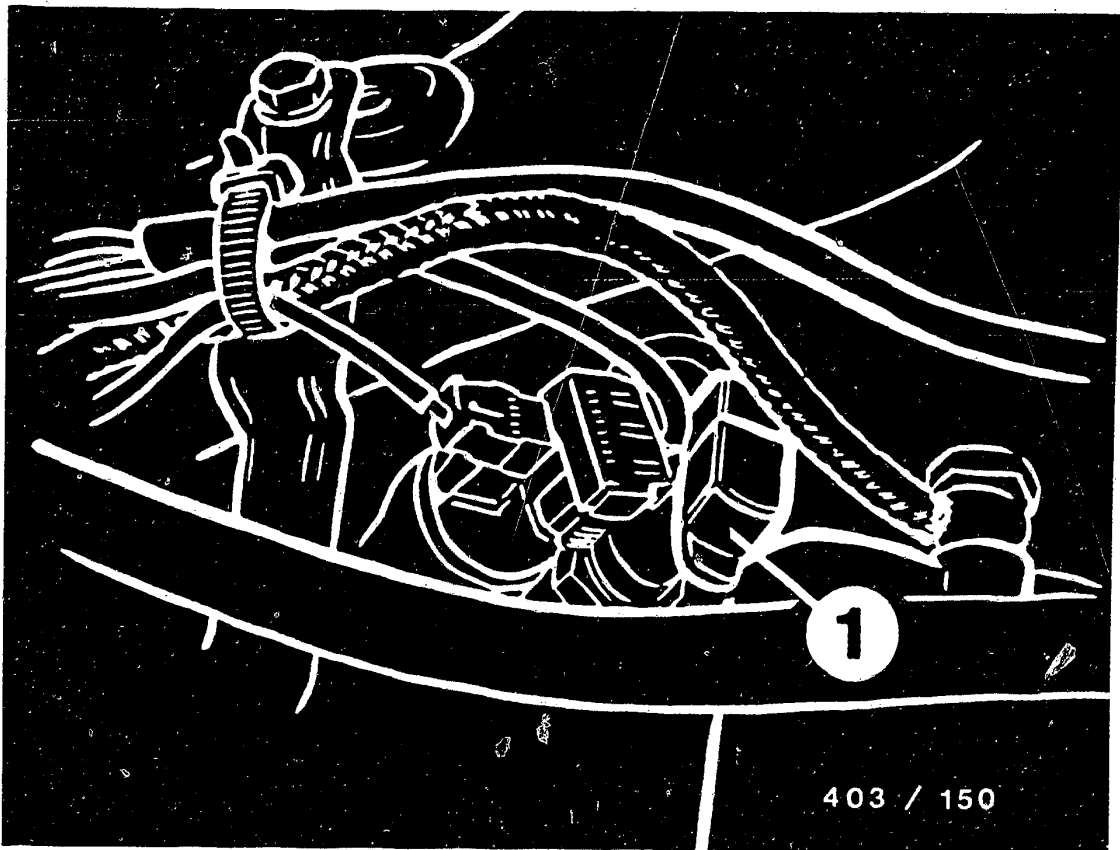
In the engine compartment next to the ABS control unit.

B5

Installation position of components

MB 124/126





1 = Coolant-temperature sensor

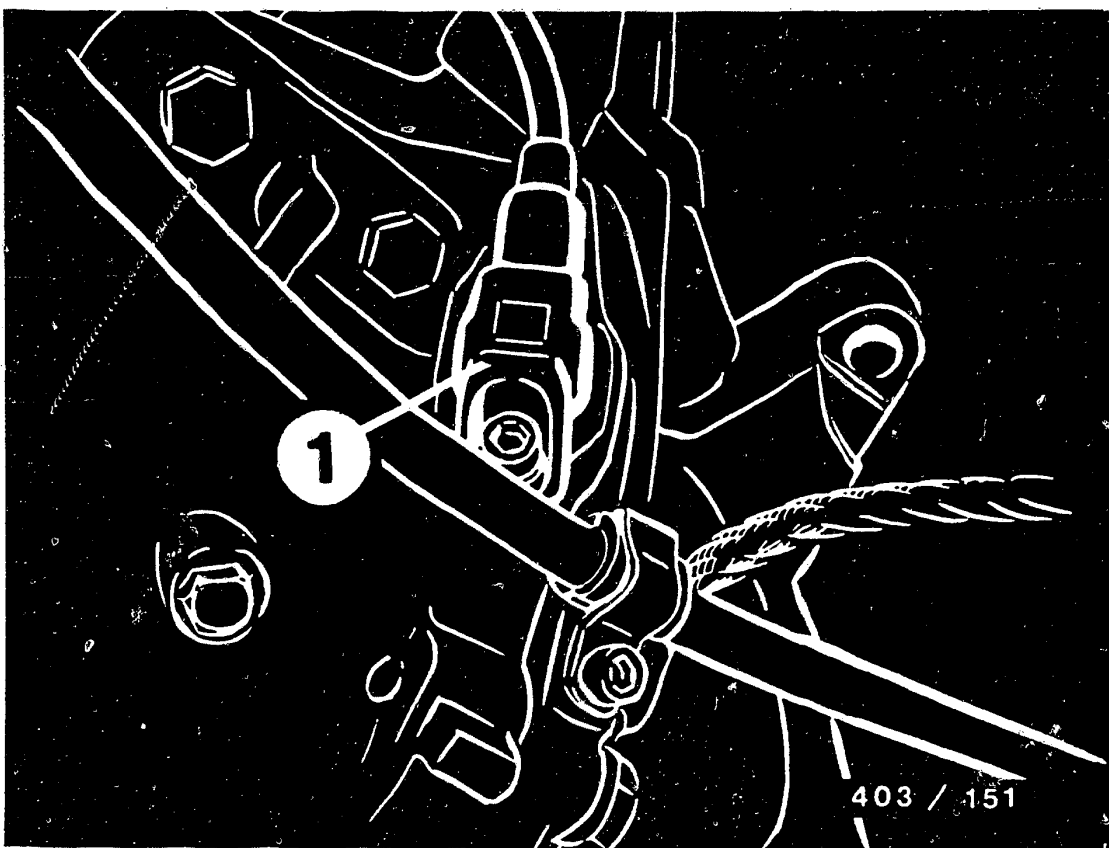
In the coolant-outlet connection.

B6

Installation position of components

MB 124/126





1 = Engine-speed sensor

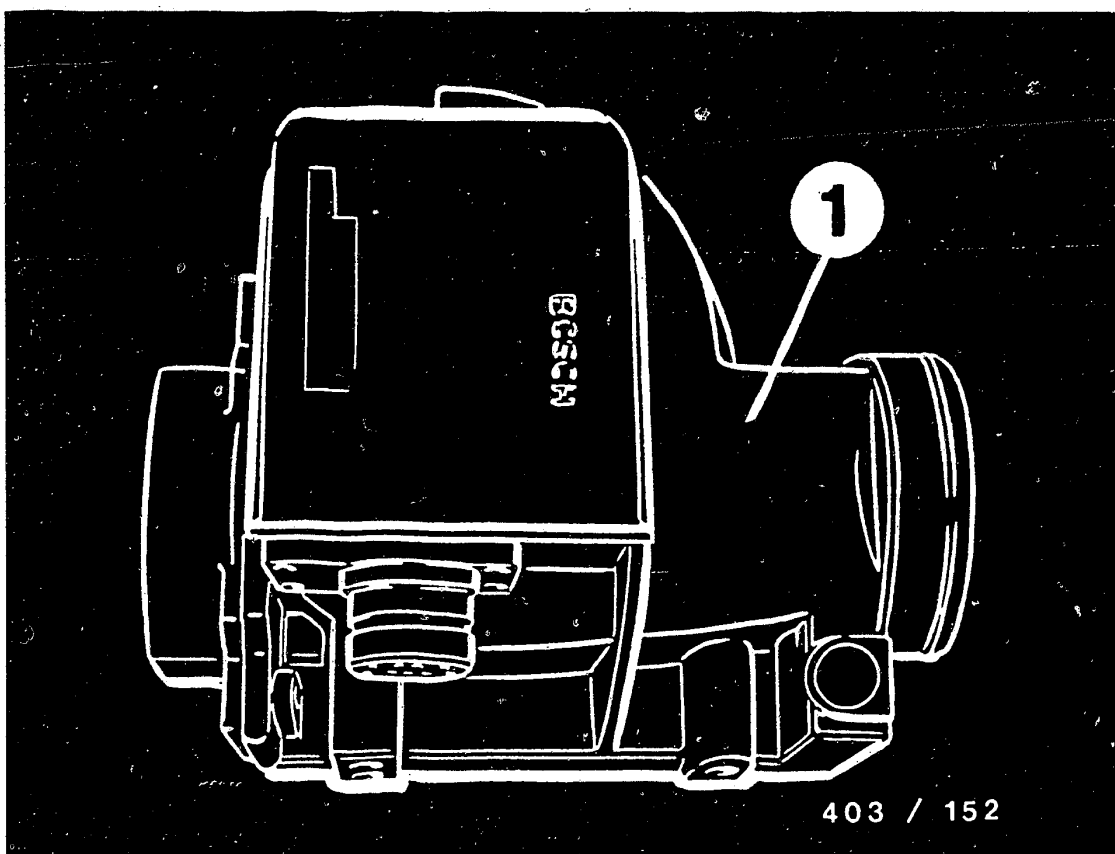
Engine-speed sensor is installed on the flange to the transmission.

B7

Installation position of components

MB 124/126





1 = Air-flow sensor

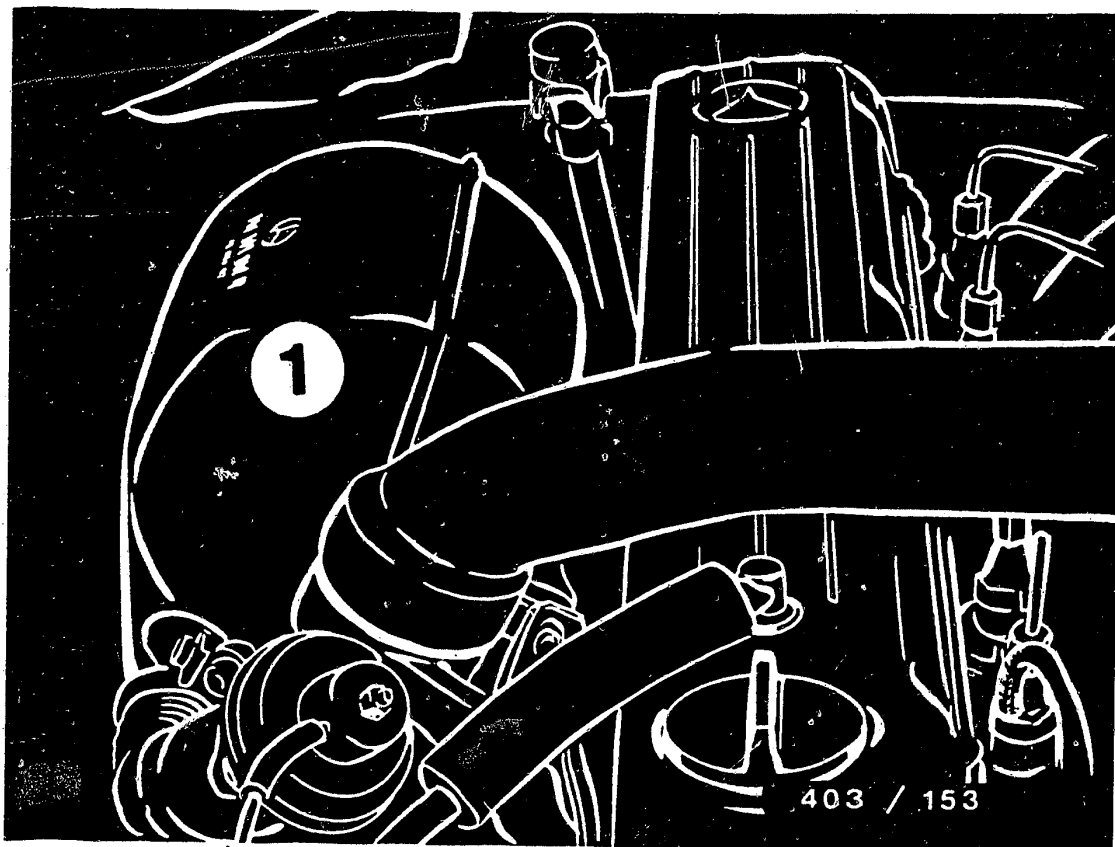
Installed in the air flow between the air filter and exhaust turbo-supercharger.

B8

Installation position of components

MB 124/126





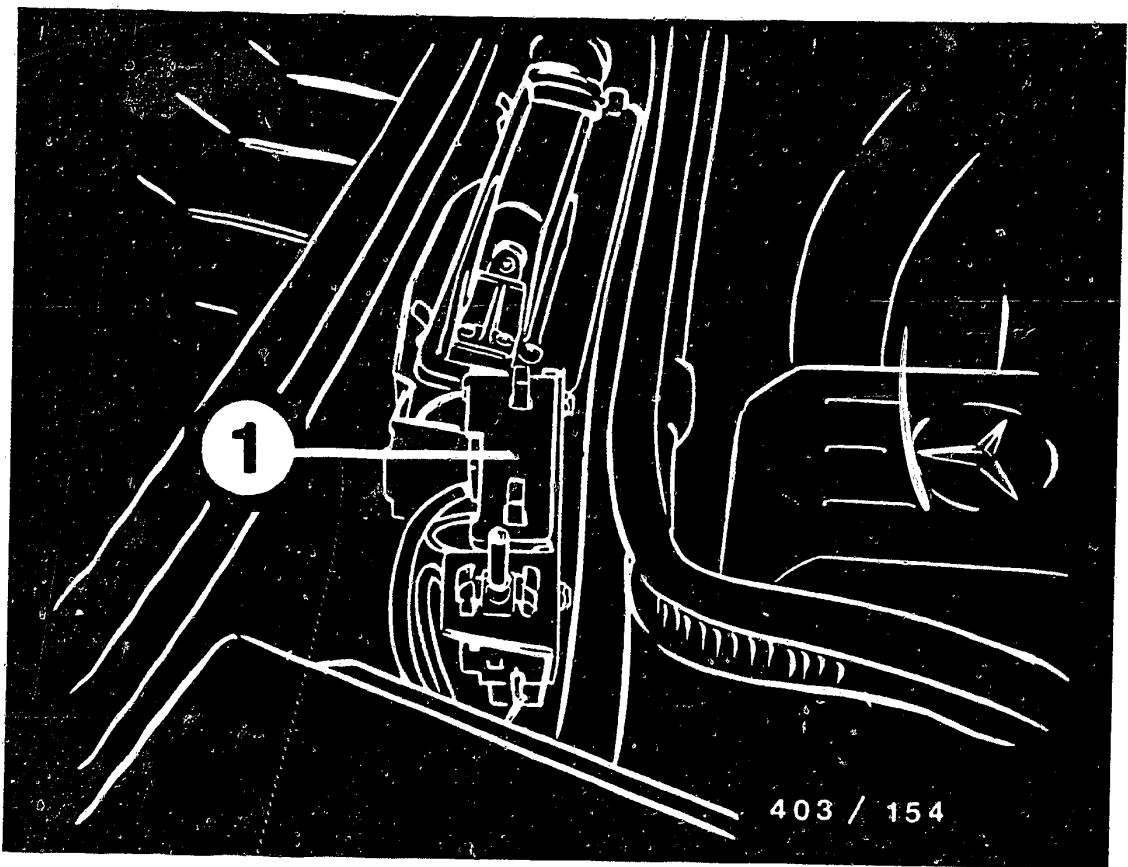
1 = Soot burn-off filter
(Type 126 CAL version only)

B9

Installation position of components

MB 124/126



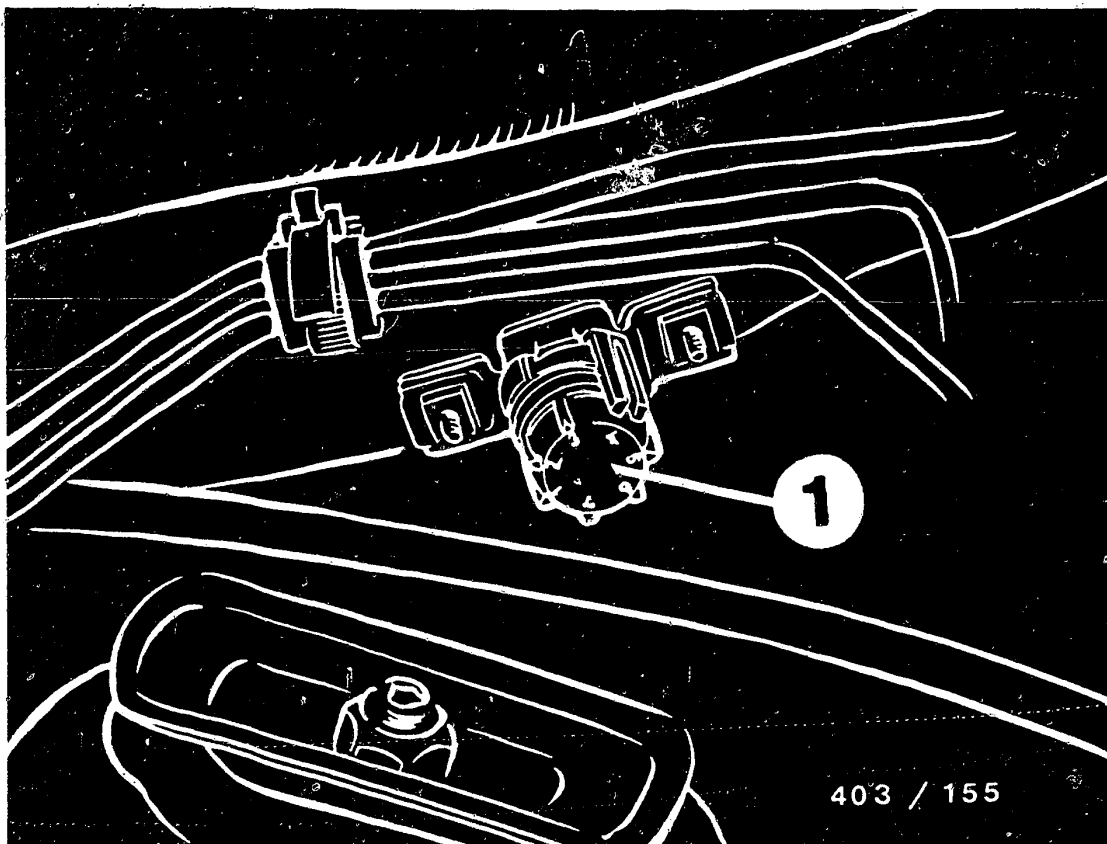


1 = Diagnostic coupling

Type 126: in the engine compartment

Type 124: on the right on the engine-compartment wall (illustration).



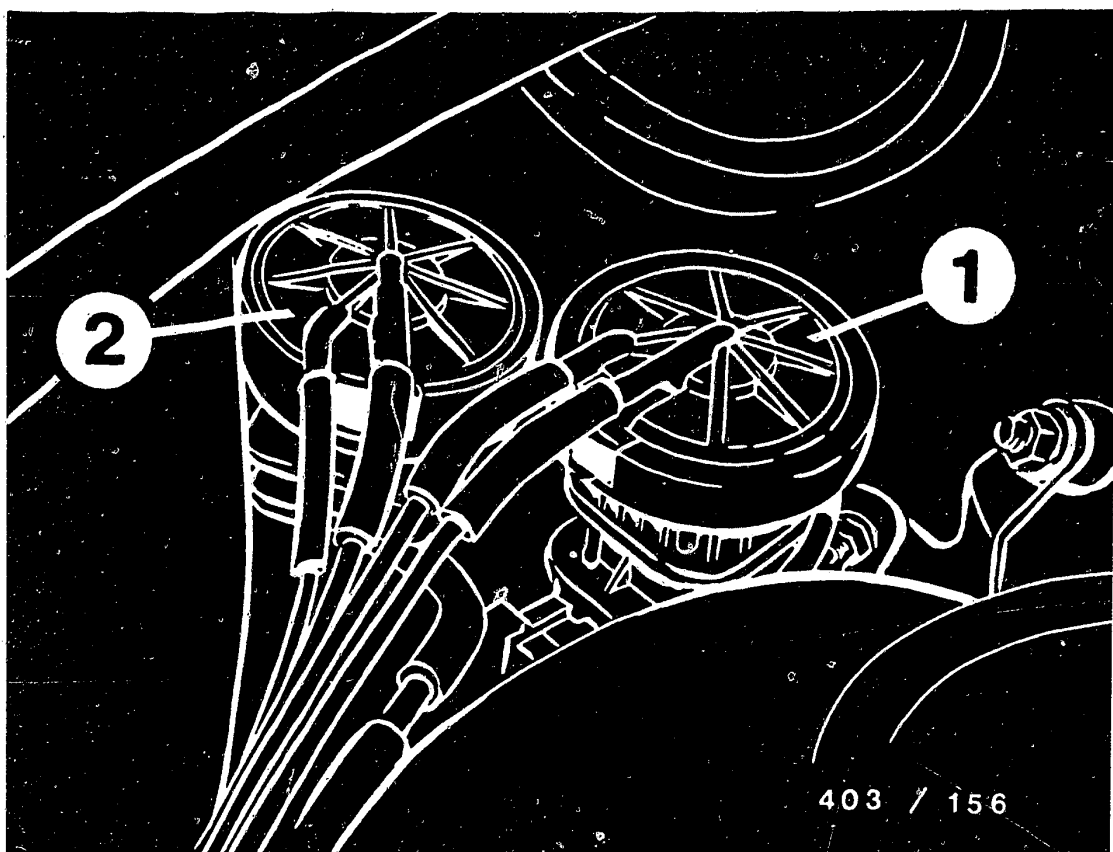


1 = Trimming plug for low-idle-speed control (ELR)

Type 124: on the side in the engine compartment (illustration).

Type 126: behind the fuse box.





- 1 = Electropneumatic pressure transducer (EGR)
- 2 = Electropneumatic pressure transducer, circulation control (CAL version)

B12

Installation position of components

MB 124/126



11. TROUBLE-SHOOTING

11.1 How to use the self-diagnosis

The control unit of the electronic diesel system has a self-diagnosis system for detecting faulty peripheral components and line paths.

Therefore, trouble-shooting (testing) must always be started with self-diagnosis.

If several faults can be called up one after the other via the self-diagnosis, note down the flashing codes of the faults. The number of flashing pulses indicates the faulty operational path involved.

If a faulty operational path is indicated, pay particular attention to the following:

- loose contacts at multiple plug-in connections
- dirty, pushed-back or corroded plug contacts
- breaks in leads at kinked or pinched locations.

Sporadically occurring faults are not indicated (control unit does not have fault memory).



Trouble-shooting (Continued)

Test instruction:

Before connecting or disconnecting the control-unit plug, always switch off the engine.

The self-diagnosis test table starting on coordinate C 09 contains fault indication (consisting of flash pulses), cause of trouble, test instructions, and the coordinate details for purposeful trouble-shooting in the self-diagnosis trouble-shooting program.

If no fault is indicated during self-diagnosis and the customer complaint has still not been eliminated, trouble-shooting must be continued with the trouble-shooting chart starting at coordinate C 01.

11.2 How to use the trouble-shooting chart

The trouble-shooting chart starting on coordinate C 01 contains customer complaints (symptoms of trouble), cause of trouble, test instructions and coordinate details which refer to:

- purposeful trouble-shooting in the trouble-shooting program
- fully self-contained component testing
- notes on removal and installation of components.

The possible cause of trouble corresponding to the customer complaint (symptom of trouble) must be selected from the trouble-shooting chart.



11.3 Safety and precautionary measures

Always observe these measures in order to prevent damage to the control unit and peripheral components of the system.

1. Never start the engine when the battery terminals are not firmly connected.
2. Do not use a fast charger for starting the engine. Starting aid must be provided using only a second 12 V battery and jump leads.
3. Disconnect the battery from the vehicle electrical system before boost charging.
4. Never disconnect the battery from the vehicle electrical system when the engine is running.
5. Never disconnect or connect control-unit plugs when the ignition is switched on.
6. Remove control units when the temperature exceeds + 80° C (paint-drying installation).
7. When welding on the vehicle (electric spot welding), remove control unit.



12. TROUBLE-SHOOTING CHART

Customer complaint (symptom of trouble)

1. Fault lamp lights
2. Starting motor operates, but engine fails to start or starts only with difficulty (when warm or cold)
3. Rough idling when engine is warm
4. Idle speed too high/too low
5. Engine misfiring during vehicle operation (part load)
6. Unsatisfactory performance
7. Engine bucking at full load
8. Fuel consumption high, maximum engine power not reached, and smoke formation

Cause (component fault)										Coordinates
●										C 09
●			●	●	●					E 15
●	●		●	●	●					E 17
●			●							E 18
●	●		●	●	●					E 20
●	●		●	●	●					E 23
●			●	●						E 23
			●	●						E 24
	●	●								F 13
		●								F 13
●	●				●					G 18
●										G 09

C1

Trouble-shooting chart

MB 124/126



C2

Trouble-shooting chart

MB 124/126



Trouble-shooting chart (Continued)

Customer complaint (symptom of trouble)

1. Fault lamp lights
2. Starting motor operates, but engine fails to start or starts only with difficulty (when warm or cold)
3. Rough idling when engine is warm
4. Idle speed too high/too low
5. Engine misfiring during vehicle operation (part load)
6. Unsatisfactory performance
7. Engine bucking at full load
8. Fuel consumption high, maximum engine power not reached, and smoke formation

<u>Cause</u>										<u>Coordinates</u>
●			●	●	●					C 24
●			●	●	●					H 02
●										H 03
			●							H 23
			●	●	●					L 11
				●						H 21
			●							D 17
		●								F 17
●	●	●	●	●	●	●				J 09
			●							M 03
			●	●						L 23
Testing turbo-supercharger for leaks and testing charge-air pressure										

C3

Trouble-shooting chart

MB 124/126



C4

Trouble-shooting chart

MB 124/126



Trouble-shooting chart (Continued)

Customer complaint (symptom of trouble)

9. Engine hunts when idling
10. Engine running rough
11. Black smoke in full-load range, engine running rough; possibly lack of power
12. Engine cannot be switched off or diesels
13. Fog-like smoke in full-load range (white)
14. Engine will not rev up when cold
15. Exhaust-gas recirculation not functioning
16. Injection pump overheats

<u>Cause</u>										<u>Coordinates</u>
				●						C 09
●	●		●							E 17
				●						E 18
				●						E 20
			●							E 23
			●	●						E 23
●										F 13
●	●			●						G 18
		●								G 15
		●	●							G 24
		●								H 23
●	●	●								L 11
Cordination, pump - engine (injection timing)										

C5

Trouble-shooting chart

MB 124/126



C6

Trouble-shooting chart

MB 124/126



Trouble-shooting chart (Continued)

Customer complaint (symptom of trouble)

9. Engine hunts when idling

10. Engine running rough

11. Black smoke in full-load range, engine running rough; possibly lack of power

12. Engine cannot be switched off or diesels

13. Fog-like smoke in full-load range (white)

14. Engine will not rev up when cold

15. Exhaust-gas recirculation not functioning

16. Injection pump overheats

|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

C7

Trouble-shooting chart

MB 124/126



C8

Trouble-shooting chart

MB 124/126



13. SELF-DIAGNOSIS TEST PROGRAM

13.1 Self-diagnosis via flashing-code evaluation

An integral self-diagnosis system in the control unit makes it possible to locate a faulty component or a line path by means of flashing codes.

Using an evaluating unit for flash diagnosis, the diagnostic program is started and indications are given by means of an integral lamp.

The program starts with the flashing pulse 1 and ends with flashing pulse 11.

The flash sequences between the start and end codes indicate the faulty operational path.



If several faults are present at the same time, they may be called up one after the other. Sporadically occurring faults (e.g. loose contact) at multiple butt connectors are not indicated (no fault memory).

If there is no fault, the indicator lamp goes out as soon as the engine is running; i.e., if engine-speed pulses are available.



13.2 Breakdown of the self-diagnosis (flashing code)

- 1 x Engine-speed sensor
- 2 x Control-rod-travel sensor
- 3 x Air-flow sensor
- 4 x Atmospheric-pressure sensor
- 5** x Exhaust-gas closed-loop control circuit
 electrical-mechanical faults:
 Exhaust-gas-recirculation valve
 Pressure transducer
 Air-flow sensor
 Circulation valve *
 Pressure transducer *
- 8 x Coolant-temperature sensor
- 9 x Intake-air temperature sensor
- 10 x Trimming plug, exhaust-gas recirculation
- 11 x Trimming plug, low-idle-speed control

* Type 126 California only

** Indication at 1200 min^{-1} (hold for min. 5 seconds).



13.3 Evaluating the flashing code

Connect socket 3 of the evaluating unit for flash diagnosis 3 KDAW 9980 to a fused positive lead.
Connect socket 4 to socket 1 of the evaluating unit.
Connect socket 2 of the evaluating unit to socket 4 of the diagnostic-socket outlet.
Start engine.

Actuate the nonlocking switch (evaluating unit) for at least 1 second in order to prevent spurious tripping.

Subsequently keep the nonlocking switch depressed.
Indicator lamp lights up.

If there is no fault in the system, the lamp goes out after a short time.

A fault in the system is indicated by steady light.

Actuate the nonlocking switch for at least one second and subsequently keep the nonlocking switch depressed. The flashing code corresponding to the faulty component is indicated.



Test conditions

- Coolant temperature 60 - 80° C
- Air conditioner off
- Selection-lever position "P"
- Fuse of overvoltage protection O.K.
- Battery voltage approx. 12 V at the overvoltage protection between the sockets 1 and 5 O.K.
- Idle speed

Governed	Trimming-plug position	Ungoverned
610 - 650	4	530 - 610



Flashing code: "1"

Component: Engine-speed sensor

Test 1: Ground terminal

Disconnect multiple butt connector (1) from engine-speed sensor.

Connect ohmmeter with commercially available test leads and test prods to one terminal post and ground in each case.

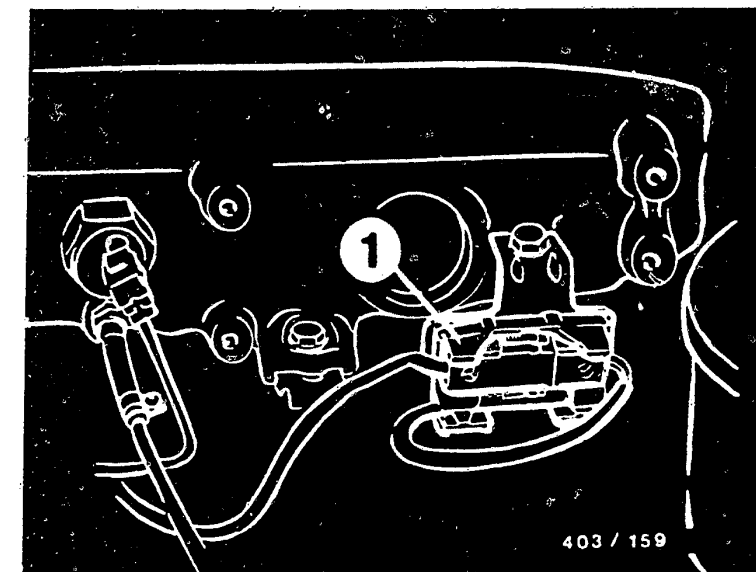
Set value: $> 1 \text{ M}\Omega$

Is set value obtained?

no

Engine-speed sensor defective, replace.

yes



403 / 159

C14

Self-diagnosis test program

MB 124/126



C15

Self-diagnosis test program

MB 124/126



Test 2: Internal resistance

Disconnect multiple butt connector from engine-speed sensor.

Connect ohmmeter with test lead to both terminal posts.

Test specification: 1.7...2.1 k Ω

no

Engine-speed sensor defective, replace.

yes

Test 3: Cable connection, control unit to component

no

Eliminate open circuit in lead and contact resistance.

Switch off ignition.

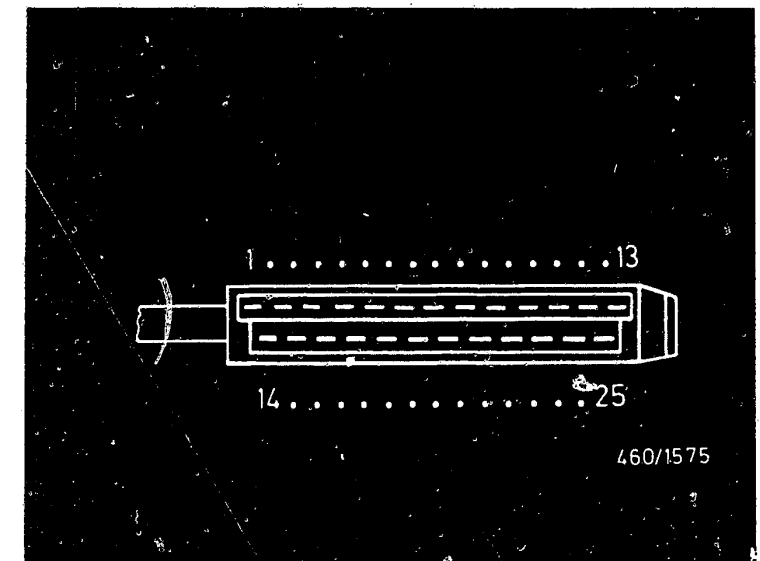
Disconnect control-unit plug 1 and test leads from term. 3 and term. 20 (upper illustration) to multiple butt connector with test leads for open circuit and contact resistance.

Jump leads at multiple butt connector.

Set value: approx. 0 Ω

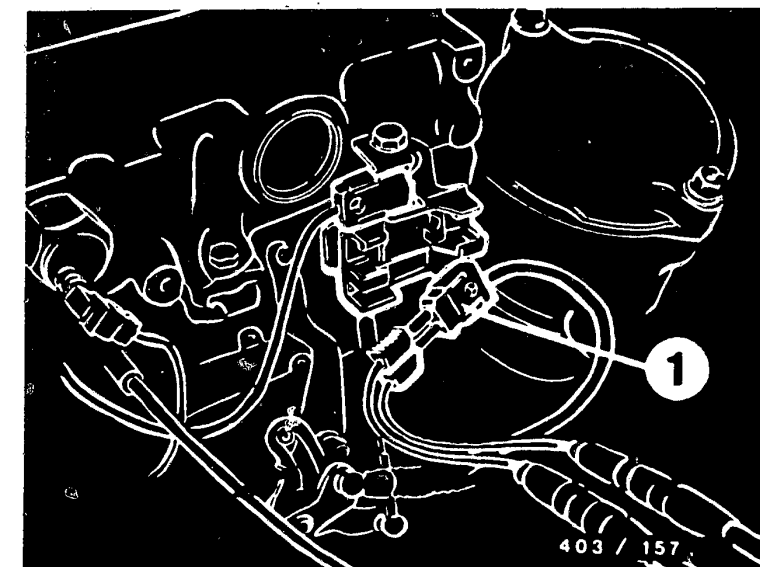
Is set value obtained?

yes



460/1575

1 = Multiple butt connector, engine-speed sensor



403 / 157

C16

Self-diagnosis test program

MB 124/126



C17

Self-diagnosis test program

MB 124/126



yes

Test 4: Engine-speed signal

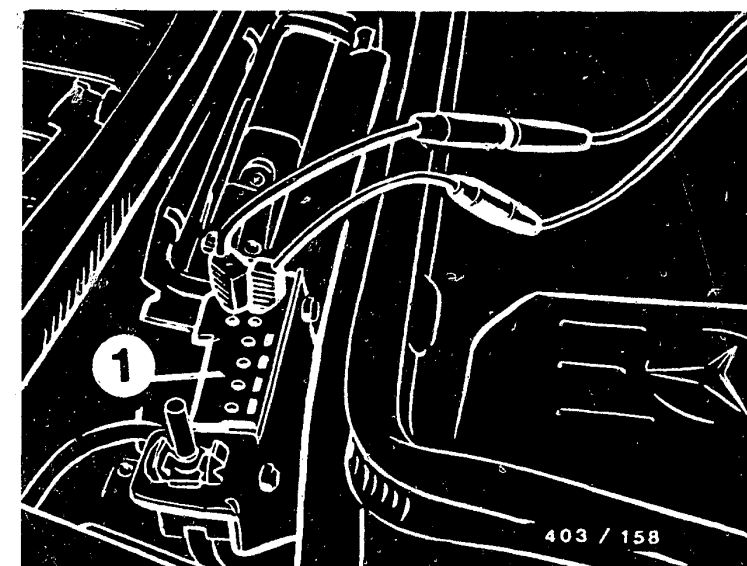
For testing, use motortester
(e.g. MOT 400). Press push-button
Special input/10 m s.
Adjust lever to left-hand stop
(calibrated voltage range).
Connect motortester with test leads
to test coupling sockets 1 and 2.
Run engine at idle speed.

Test specification: min. 2.8 V AC

no

1. No signal or signal too small: -
test air gap.

- Replace sensor.



1 = Test coupling

yes

C18

Self-diagnosis test program

MB 124/126



C19

Self-diagnosis test program

MB 124/126



Test 5:

Test engine-speed sensor for dirt

Disconnect multiple butt connector from engine-speed sensor. Connect test lead to both terminal posts. Run engine at idle speed.

Test specification: min. 4 V AC

Note:

When engine speed increasing - voltage increasing.

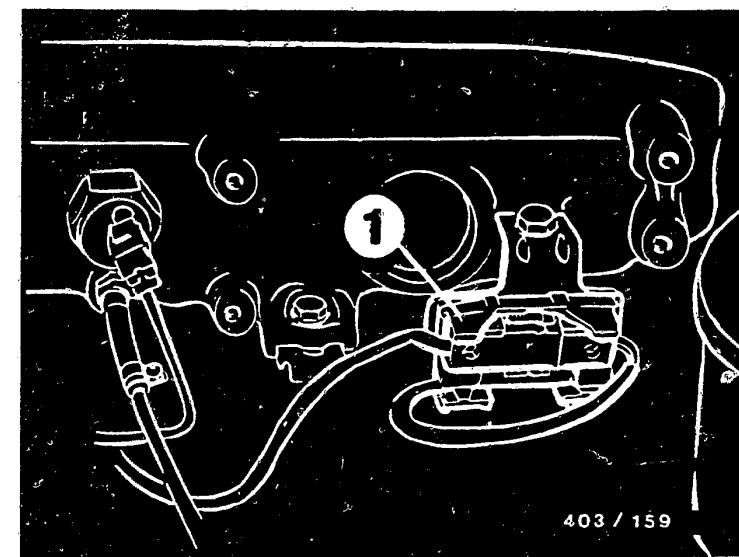
Is voltage value obtained?

no

Clean engine-speed sensor.

yes

End of test



1 = Multiple butt connector, engine-speed sensor

C20

Self-diagnosis test program

MB 124/126



C21

Self-diagnosis test program

MB 124/126



Flashing code: "2"

Component

Control-rod-travel sensor

Test 1: Internal resistance

Switch off ignition. Turn mounting (arrow) and disconnect cable connector from the injection pump.

Connect ohmmeter with commercially available test leads and test prods to the terminal posts.

Test value: 1 - 2 = approx. 23 - 27 Ω

1 - 3 = approx. 23 - 27 Ω

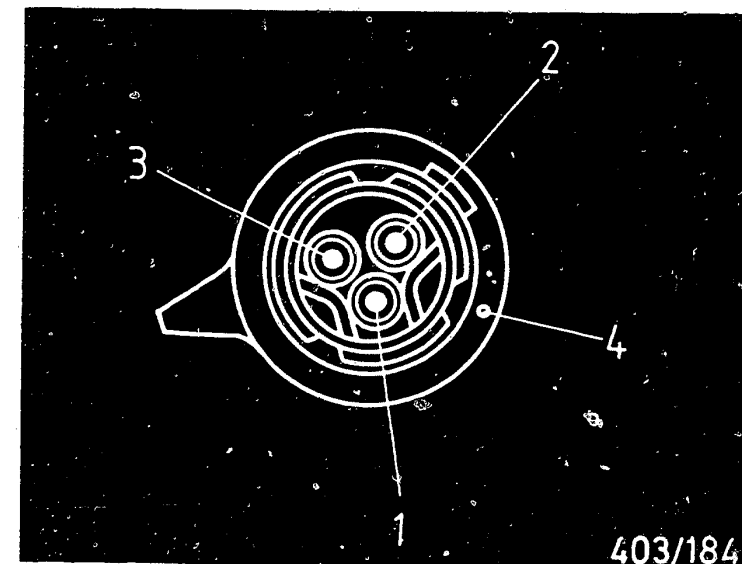
2 - 3 = approx. 46 - 54 Ω

no

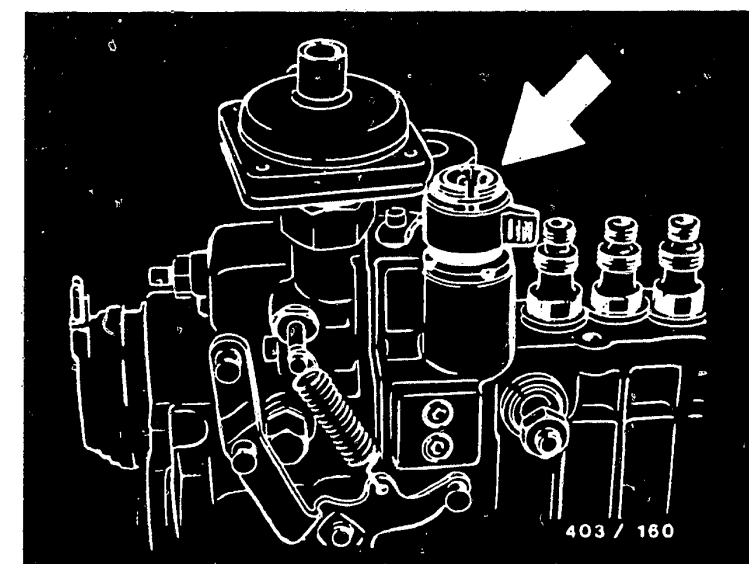
Control-rod-travel sensor defective.

Remove injection pump.

yes



4 = Cable-connector coupling



C22

Self-diagnosis test program

MB 124/126



C23

Self-diagnosis test program

MB 124/126



Test 2: Voltage supply

Switch on ignition.

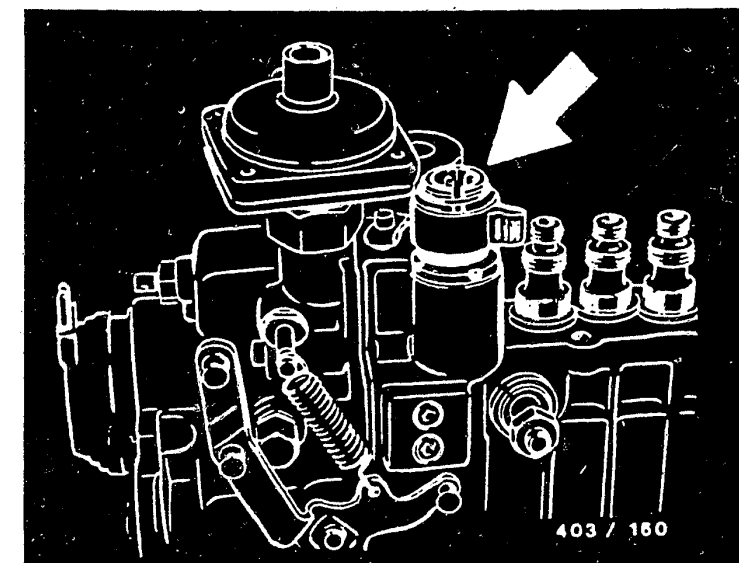
Connect voltmeter with test leads to the sockets 1 and 2 of the plug-in connector (arrow).

Test specification: approx. 10V

no

Test cable connection for open circuit.

yes



D1

Self-diagnosis test program

MB 124/126



D2

Self-diagnosis test program

MB 124/126



Test 3: Cable connection, control unit to component

Disconnect control-unit plug and test leads from term. 5 and term. 6 to cable connector of the control-rod-travel sensor for open circuit.

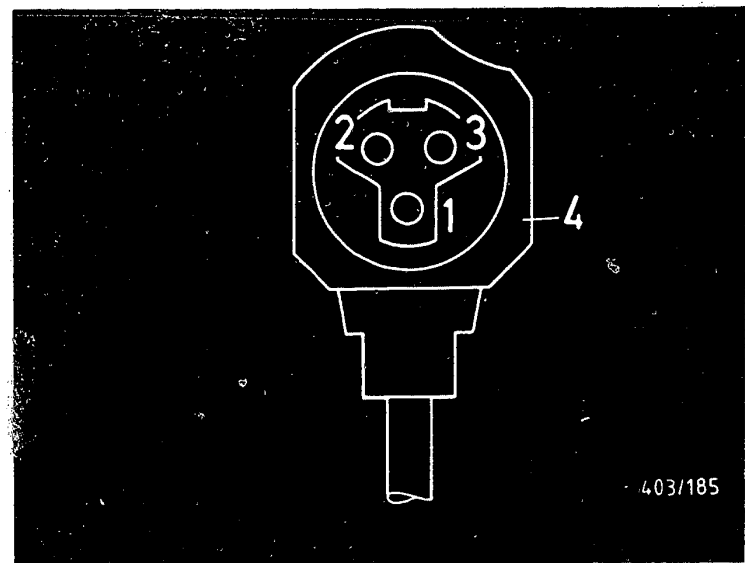
Jump sockets 1 and 2 at the cable connector.

Set value: 0 Ω

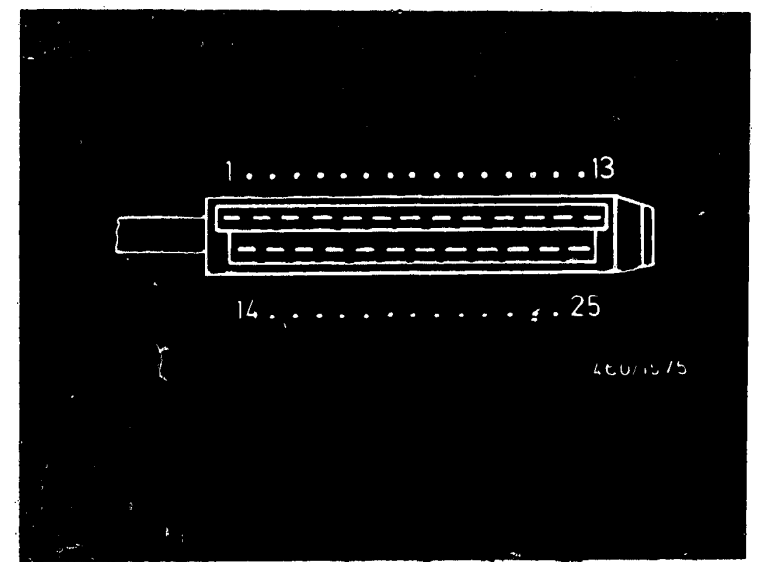
no
Eliminate open circuit.
Replace control unit.

yes

End of test.



4 = Cable connector



Flashing code: "3"

Component: Air-flow sensor

Test 1: Total resistance

Disconnect cable connector from
air-flow sensor.

Connect ohmmeter with test leads
to sockets 2 and 3 (center illus-
tration, arrows).

Set value:

Air-flow sensor flap in idle
position

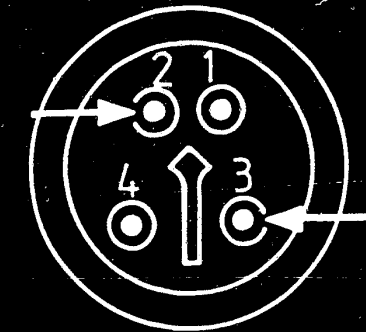
approx. 50 - 200 Ω

Air-flow sensor flap fully deflected,
approx. 560 - 1100 Ω

Is set value obtained?

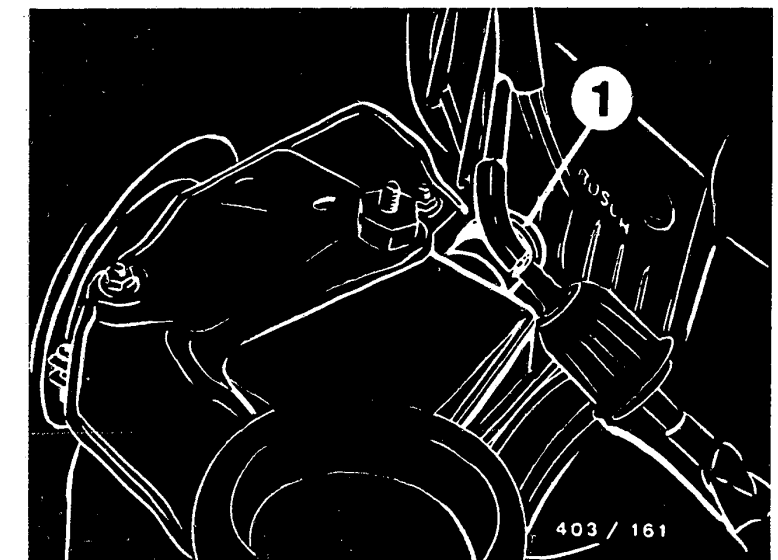
no Test air-flow sensor flap for free-
dom of movement and dirt.
Replace air-flow sensor.

yes



403/186

1 = Cable connector



403 / 161

D5

Self-diagnosis test program

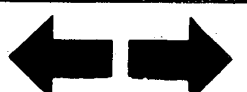
MB 124/126



D6

Self-diagnosis test program

MB 124/126



Test 2: Cable connection, control unit to component

Test leads from term. 3 and term. 10 of control unit to cable connector of the air-flow sensor for open circuit.

Jump sockets 2 and 3 at cable connector of air-flow sensor.

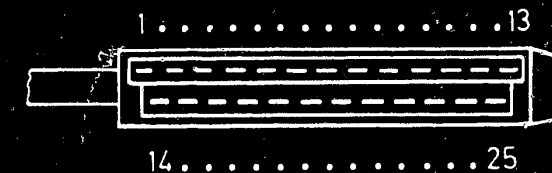
Set value: approx. 0 Ω

Is set value obtained?

no

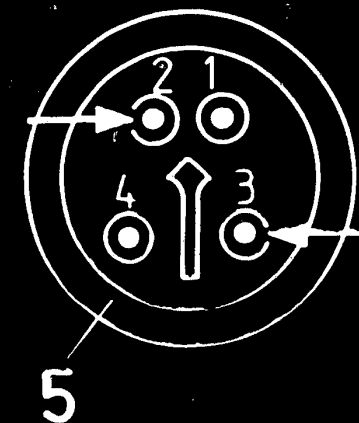
Eliminate open circuit.

yes



460/1575

5 = Cable connector



403/186a

D7

Self-diagnosis test program

MB 124/126



D8

Self-diagnosis test program

MB 124/126



Test 3: Voltage supply

Connect voltmeter with test leads KDZS 0004 to air-flow-sensor cable connector sockets 2 and 4 or 1 and 2 (upper illustration).

Connect control unit.

Switch on ignition.

Set value: approx. 5 V

Is set value obtained?

no

Eliminate open circuit.
Replace control unit.

yes

Test 4: Voltage signal, air-flow sensor

Connect cable connector with commercially available test leads to air-flow sensor.

Switch on ignition.

Connect voltmeter with test leads KDZS 0004 to term. 2 and 3.
To do this, pull back rubber cap on cable connector.

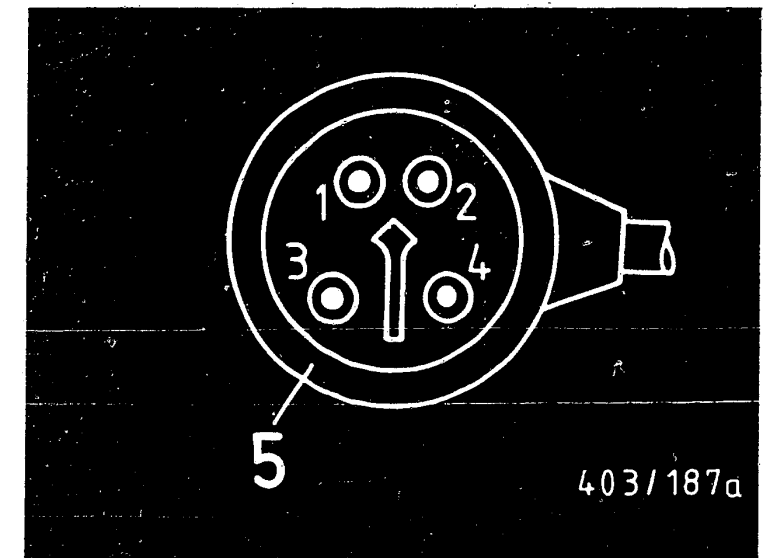
Test specification: 0.25...4.75 V

(Through changing the air-flow sensor flap position).

no

Exchange air-flow sensor.

yes



5 = Cable connector

D9

Self-diagnosis test program

MB 124/126



D10

Self-diagnosis test program

MB 124/126



**Test 5: Potentiometer test
(noise test).**

For testing, use motortester.

Press push-buttons Special input
and 10 ms.

Connect cable connector/air-flow
sensor with commercially available
test leads to air-flow sensor.

Connect motortester with test leads
KDZS 0004 to cable connector term. 2
and term. 3 (upper illustration).

Switch on ignition.

Deflect air-flow sensor flap
violently several times (center
illustration).

If the air-flow sensor is
operating properly, a stroke
signal without dips must be
visible on the oscilloscope.

If the air-flow sensor is defective,
a noise signal appears similar to the
one illustrated opposite.

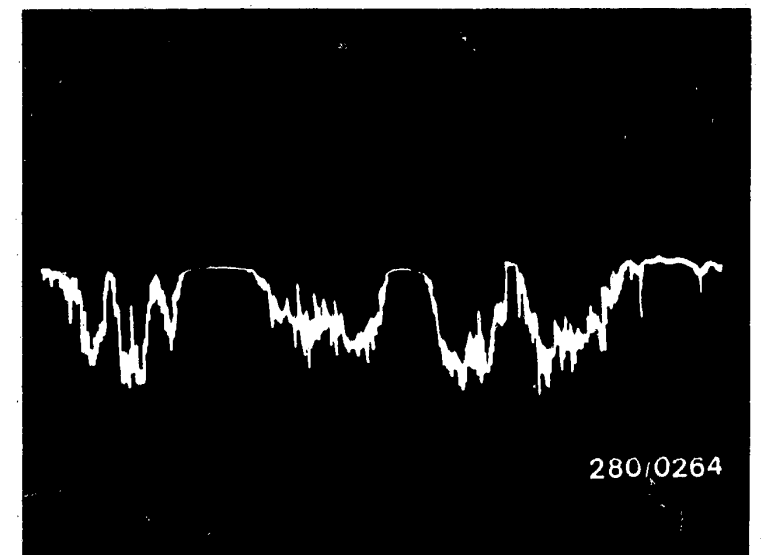
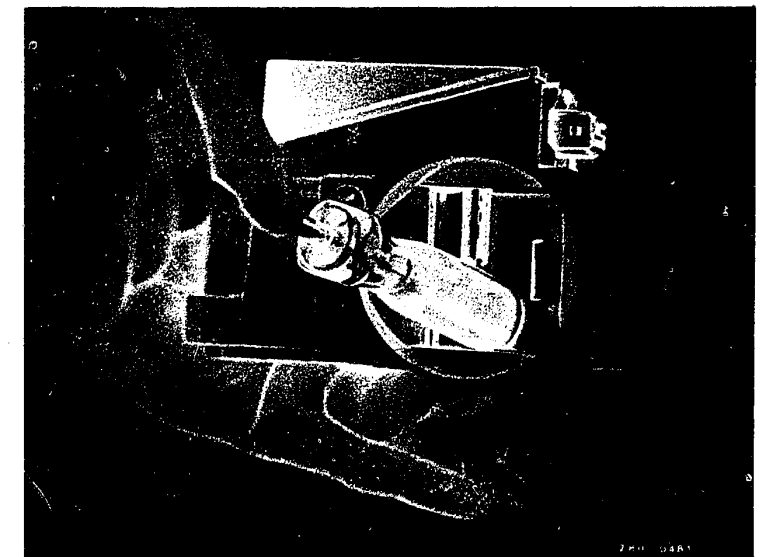
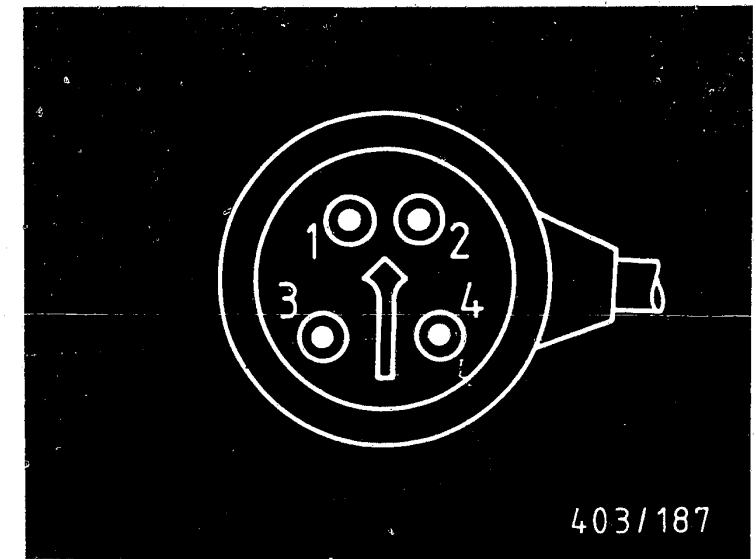
Signal pattern O.K.?

no

Air-flow sensor defective, replace.

yes

End of test



D11

Self-diagnosis test program
MB 124/126



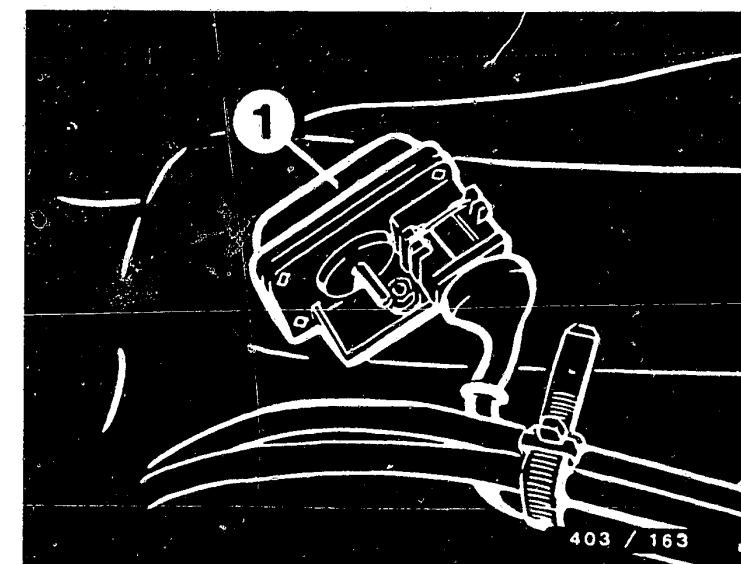
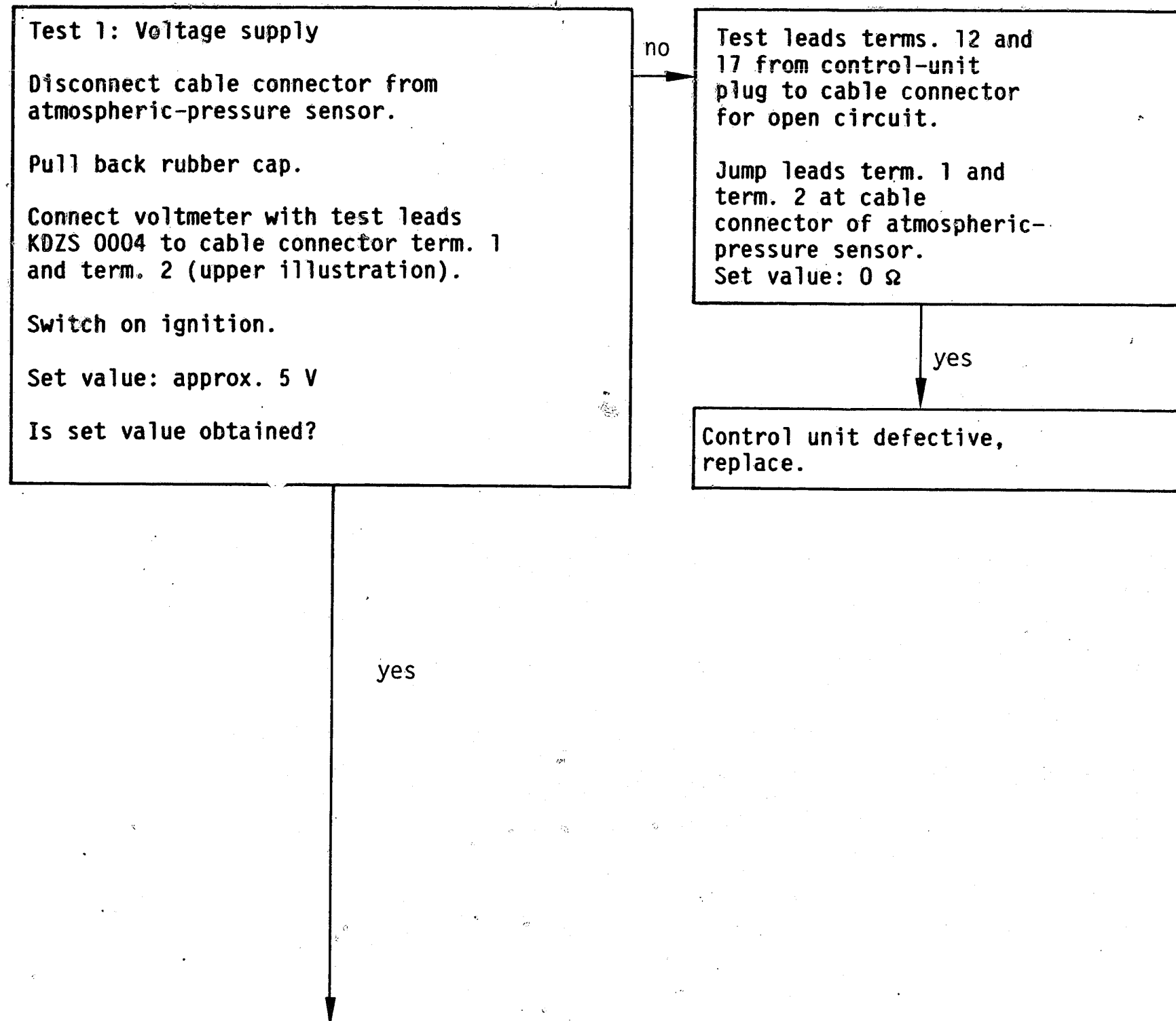
D12

Self-diagnosis test program
MB 124/126

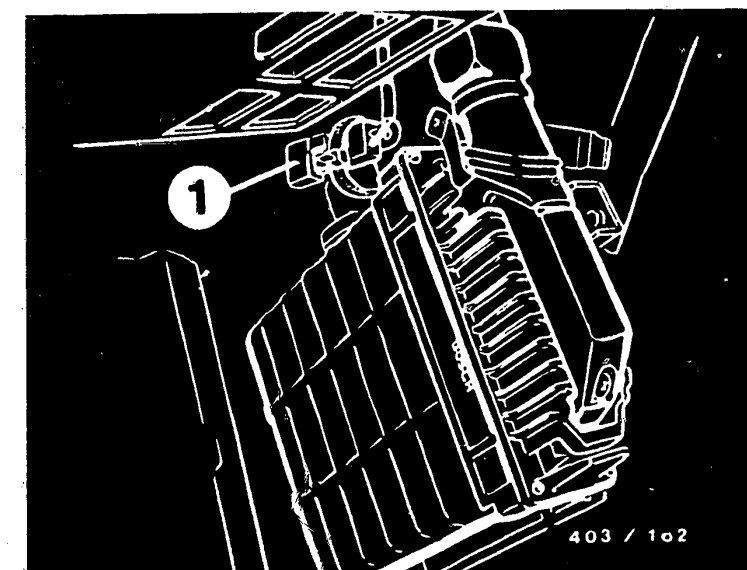


Flashing code: "4"

Component: Atmospheric-pressure sensor.



1 = Atmospheric-pressure sensor
Illustration a = Type 124
Illustration b = Type 126



D13

Self-diagnosis test program

MB 124/126



D14

Self-diagnosis test program

MB 124/126



Test 2: Voltage signal, atmospheric-pressure sensor

Connect cable connector to atmospheric-pressure sensor. Pull back rubber cap on cable connector.
Connect voltmeter with test leads KDZS 0004 to cable connector term. 1 and term. 3.
Measure atmospheric pressure (barometric pressure).

Switch on ignition.

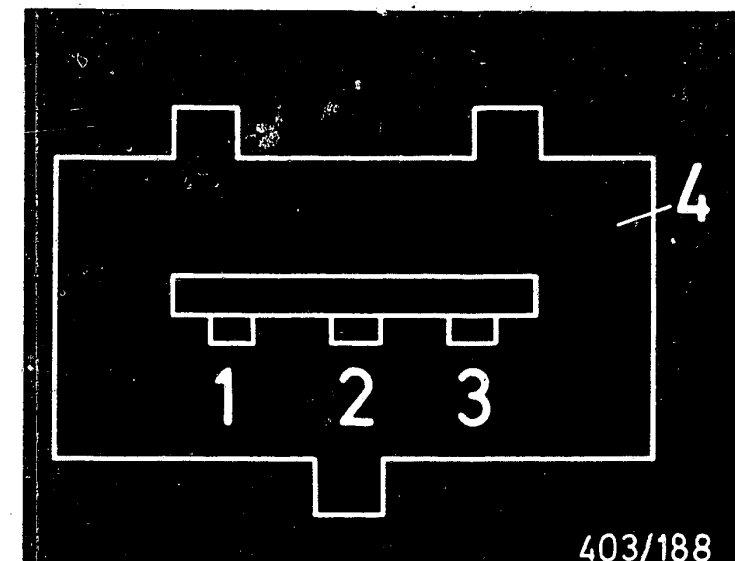
Voltage value must change.

Does voltage value change?

no Replace atmospheric-pressure sensor.

yes

End of test



4 = Cable connector, atmospheric-pressure sensor

D15

Self-diagnosis test program

MB 124/126



D16

Self-diagnosis test program

MB 124/126



Flashing code: "5"

Component: Exhaust-gas closed-loop control circuit

Test 1: Vacuum control, exhaust-gas-recirculation valve

Apply a vacuum of approx. 300 mbar to EGR valve.
Disconnect vacuum line.
EGR valve must close audibly.

no

Replace EGR valve.

yes

Test 2: Vacuum control, pressure transducer

Connect vacuum tester with Y distributor to (Out) connection of pressure transducer.

Disconnect cable connector from pressure transducer.
Connect voltmeter with test lead to pressure transducer.
Run engine at 850 min⁻¹.

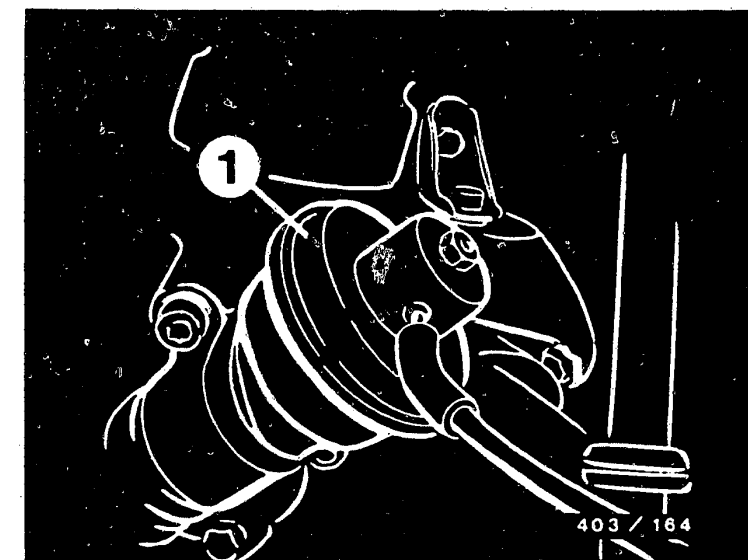
Test specification: see characteristic curve.

Set value: 0 mA ?

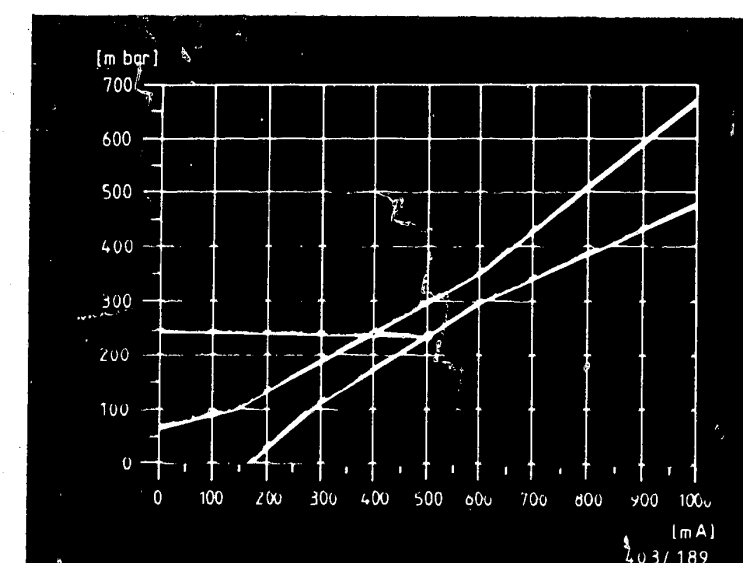
no

If the power consumption at pressure transducer too low:
- test ventilation line (b1) and filter after laying of vacuum lines for throughflow.

yes



1 = Exhaust-gas-recirculation valve



D17

Self-diagnosis test program

MB 124/126



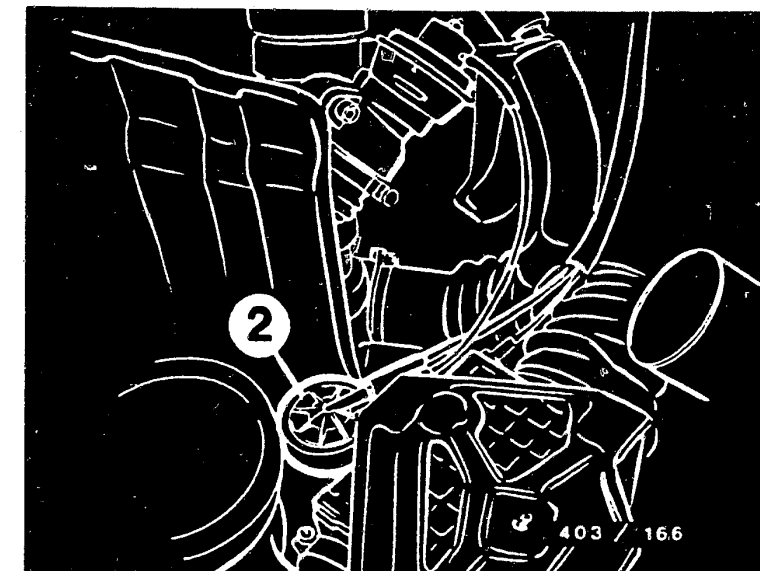
D18

Self-diagnosis test program

MB 124/126

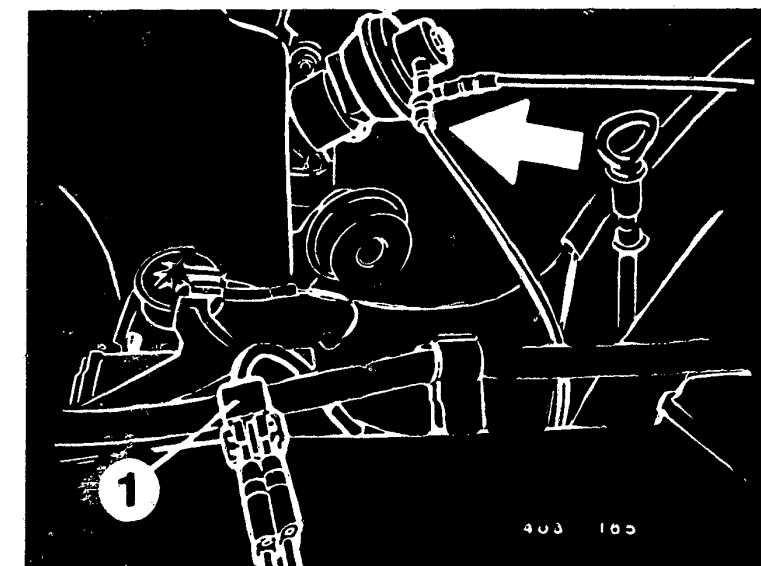


Power consumption too high:
- test supply line wh/br (arrow) for throughflow.
Procedure:
Interrupt vacuum line between pressure transducer and EGR valve.
Test vacuum pump.
If vacuum line and vacuum pump O.K.
- replace pressure transducer.



2 = Electropneumatic pressure transducer

1 = Cable connector, pressure transducer



yes

no

yes

Switch off engine.
Switch on ignition.
Disconnect cable connector from pressure transducer (2).
Connect voltmeter with test leads to cable connector.
Set value: 12 V

Test leads term. 19 and term. 7 from control-unit plug to cable connector of pressure transducer for open circuit.
Jump cable connector of pressure transducer.
Set value: 0 Ω
Replace control unit.

D19

Self-diagnosis test program
MB 124/126



D20

Self-diagnosis test program
MB 124/126



Connect vacuum tester with Y distributor to EGR valve (arrow).

Briefly accelerate. Engine speed at 1200 min⁻¹.
If control system intact, vacuum must drop.

no

Replace pressure transducer.

- Replace control unit.
- Check air-flow sensor mechanically.

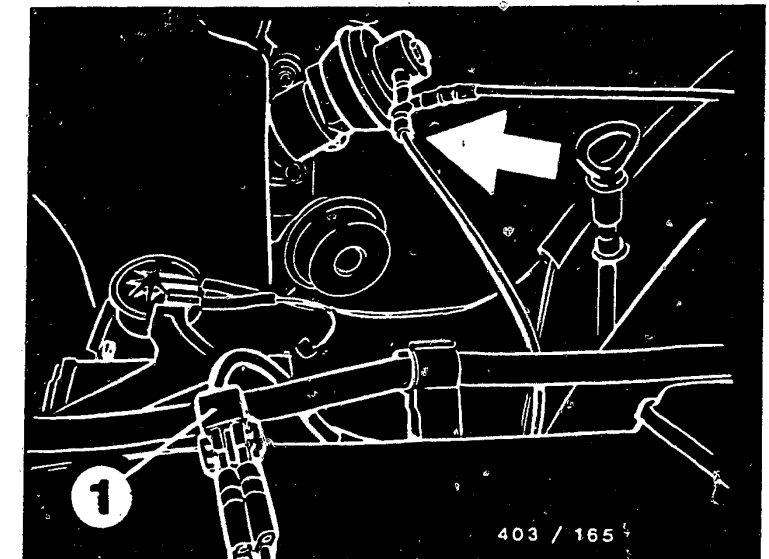
Procedure:

Test air-flow sensor flap for freedom of movement.
Air-flow sensor flap must not move jerkily. Otherwise, replace air-flow sensor.

yes

End of test, Type 124
US version

Type 126 California version on next
coordinate.



D21

Self-diagnosis test program

MB 124/126



D22

Self-diagnosis test program

MB 124/126



Test 3: Cable connection, circulation-valve pressure transducer

Type 126 - California version

Switch off ignition.
Disconnect control-unit plug and test leads from term. 8 and term. 19 to pressure-transducer cable connector (2) for open circuit.
Jump leads term. 1 and term. 2 at pressure-transducer cable connector.

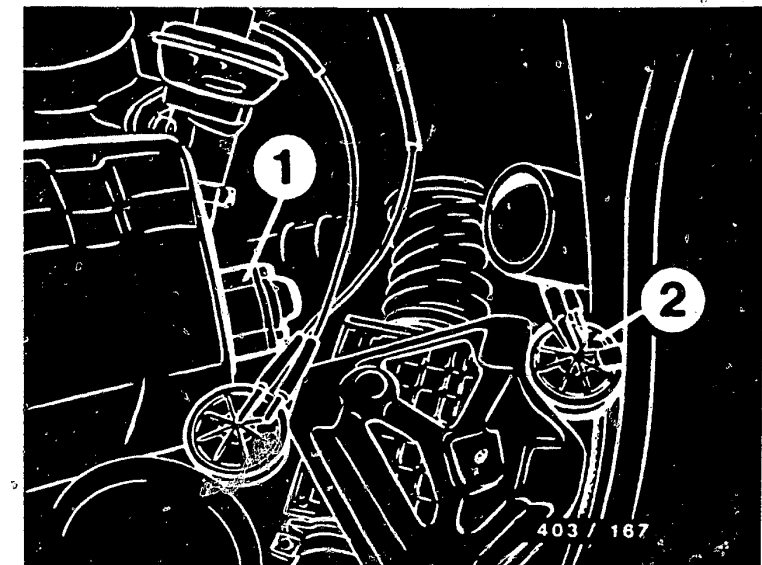
Set value: 0 Ω

Is set value obtained?

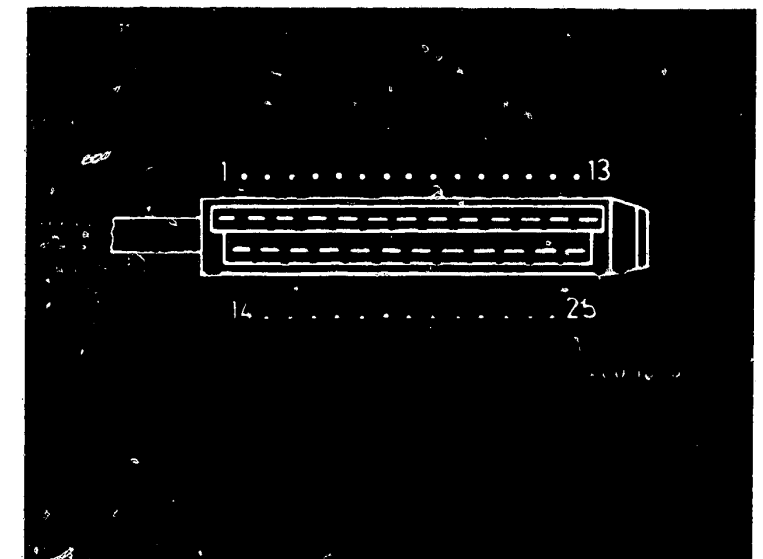
no

Eliminate open circuit in lead.

yes



1 = Circulation valve
2 = Pressure transducer



D23

Self-diagnosis test program

MB 124/126



D24

Self-diagnosis test program

MB 124/126



Test 4: Voltage supply, circulation-valve pressure transducer

Switch off engine.

Switch on ignition.

Disconnect cable connector from pressure transducer.

Connect voltmeter with commercially available test leads to cable connector.

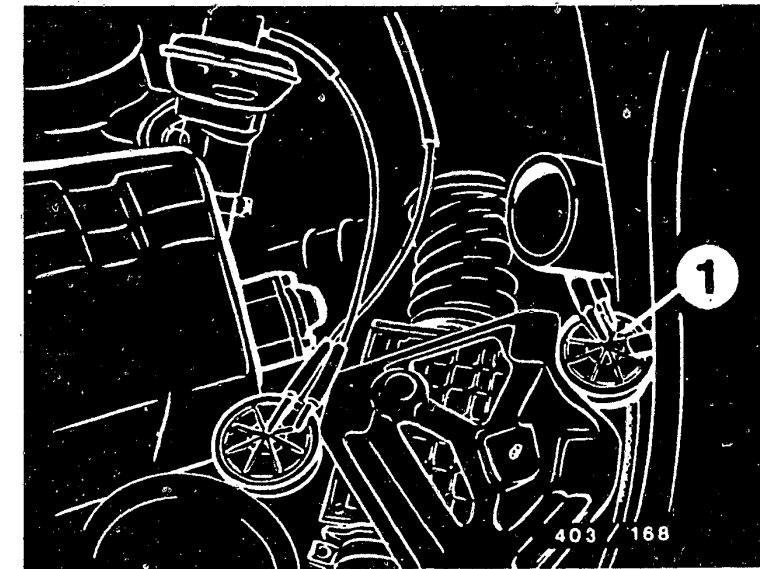
Set value: 12 V

Is set value obtained?

no

Replace pressure transducer.

yes



1 = Pressure transducer
circulation valve

E1

Self-diagnosis test program

MB 124/126



E2

Self-diagnosis test program

MB 124/126



**Test 5: Vacuum control,
circulation valve**

- California version -

Apply a pressure of approx. 400 mbar to
circulation valve (1) and test for leaks.

Pressure drop after 1 min.: max. 50 mbar.

no

Replace circulation valve.

yes

Test 6: Pressure transducer

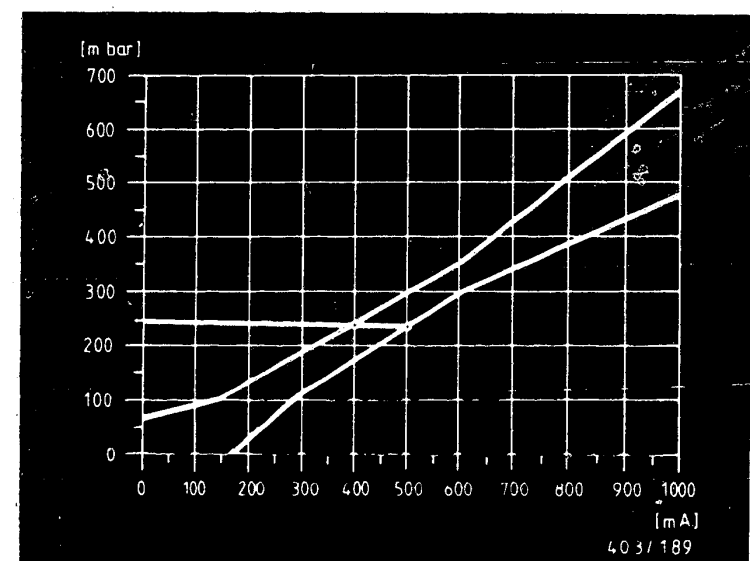
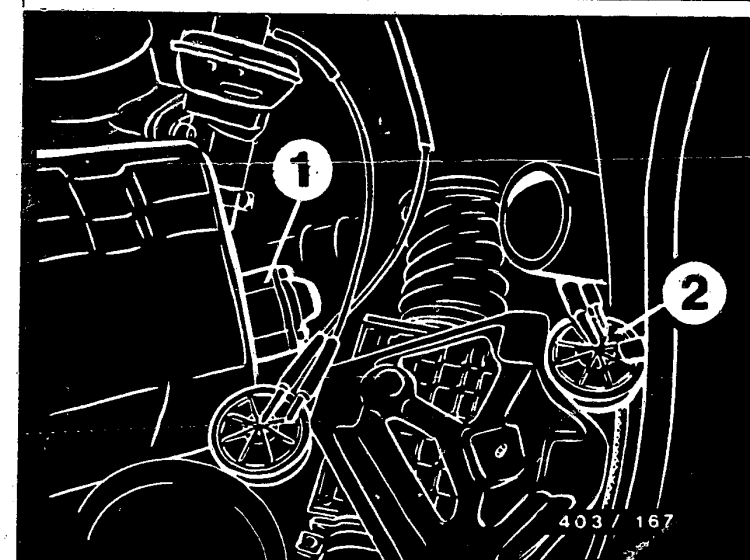
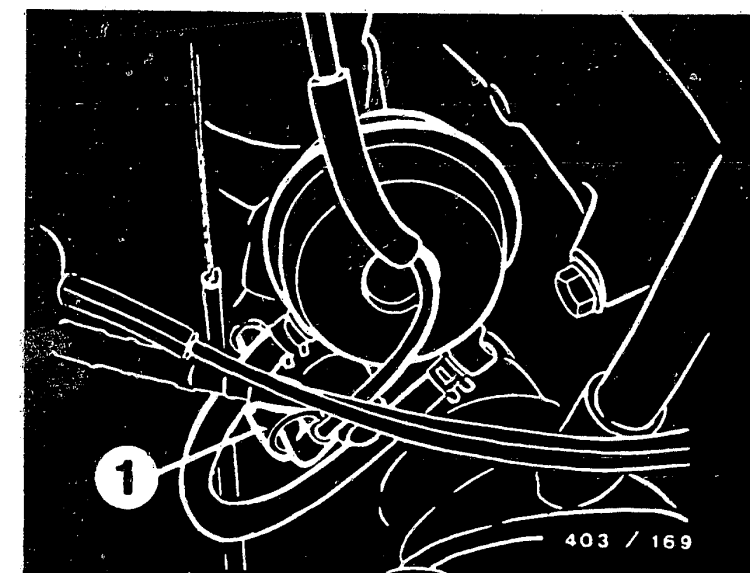
Connect vacuum tester with Y distributor to
circulation valve.

Connect voltmeter with test lead to pressure
transducer (2). Set voltmeter to "mA".

Read off power supply at the following engine
speeds.

Engine speed (min ⁻¹)	Vacuum (mbar)	Power consumption (mA)
Idle	approx. 60	0
approx. 1300	approx. 400*	approx. 800
approx. 3400	approx. 60	0

* See chart



E3

Self-diagnosis test program

MB 124/126



E4

Self-diagnosis test program

MB 124/126



Are set values obtained?

no

Vacuum too high:

Test ventilation line (bl) and filter for throughflow in accordance with diagram of vacuum lines.

Vacuum too low:

Test supply line (wh/br) for throughflow.

Test vacuum line (wh/vi/br) between pressure transducer and circulation valve for throughflow.

If vacuum line and supply line O.K.
- replace pressure transducer.

yes

End of test

E5

Self-diagnosis test program

MB 124/126



E6

Self-diagnosis test program

MB 124/126



Flashing code: "8"

Component: Water-temperature sensor

Test 1: Resistance

Disconnect cable connector from temperature sensor. Test ohmmeter with test lead to ground (upper illustration).

Set values: see chart.

Set value at:

+ 20° C = 2200-2800 Ω

+ 80° C = 290- 364 Ω

+ 100° C = 140- 222 Ω

no

Coolant-temperature sensor defective, replace.

yes

Test 2: Voltage supply

Disconnect cable connector from coolant-temperature sensor. Connect voltmeter with commercially available test lead to 1-pin plug.

Switc on ignition.

Set value: approx. 5 V

Is set value obtained?

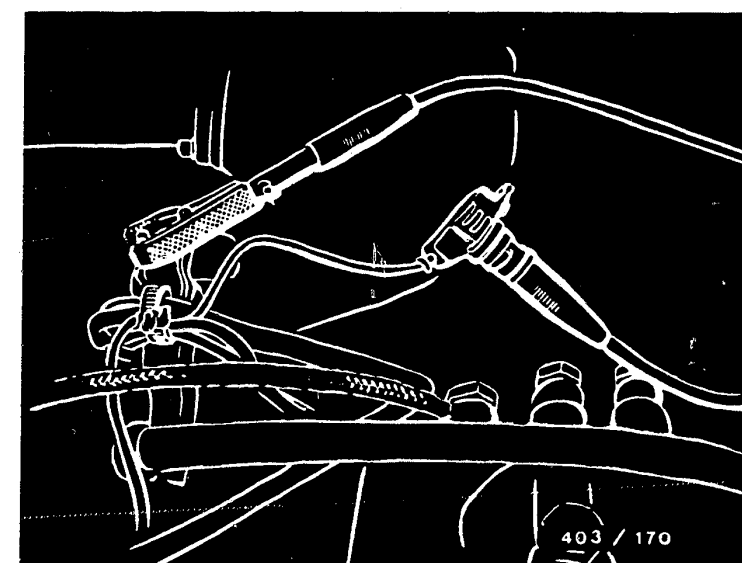
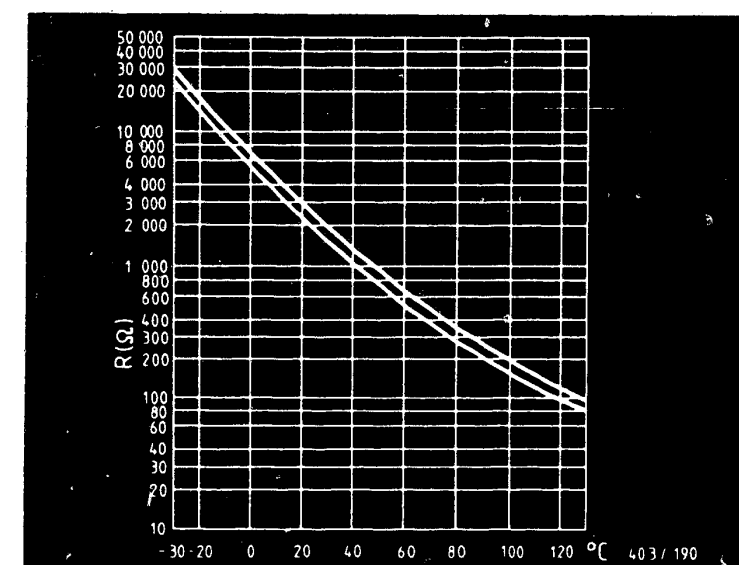
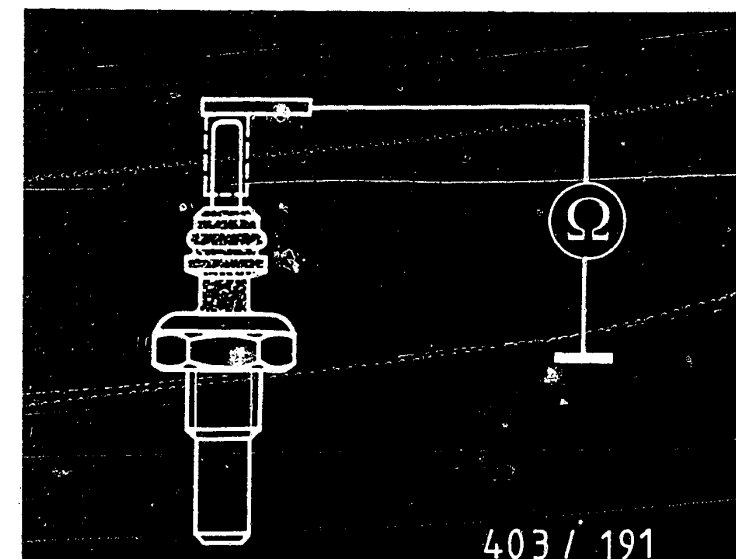
no

Test lead term. 9 from control unit to cable connector of coolant-temperature sensor for open circuit.

Set value: 0 Ω

If set value is obtained - replace control unit.

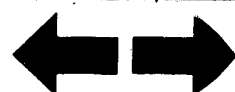
yes



E7

Self-diagnosis test program

MB 124/126



E8

Self-diagnosis test program

MB 124/126



Flashing code: "9"

Component: Air-temperature sensor

Test 1: Cable connection, control unit to component

Disconnect cable connector and test leads term. 3 and term. 22 to cable connector of air-flow sensor for open circuit.

Jump sockets 1 and 2 at cable connector of air-flow sensor.

Set value: 0 Ω

no

Eliminate open circuit in lead.

yes

Test 2: Resistance

Disconnect cable connector from air-flow sensor.

Connect ohmmeter with commercially available test leads to terminal posts 1 and 2 (arrow).

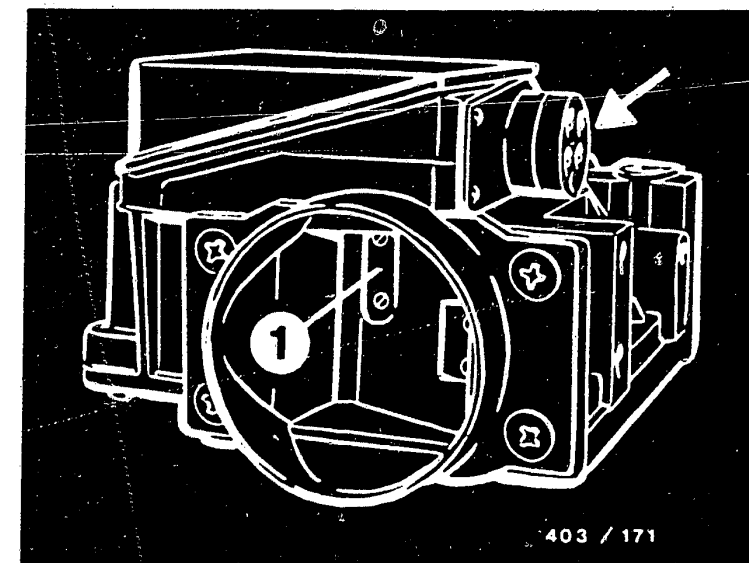
Set value: + 20° C = 2.2 - 2.8 k Ω

Is set value obtained?

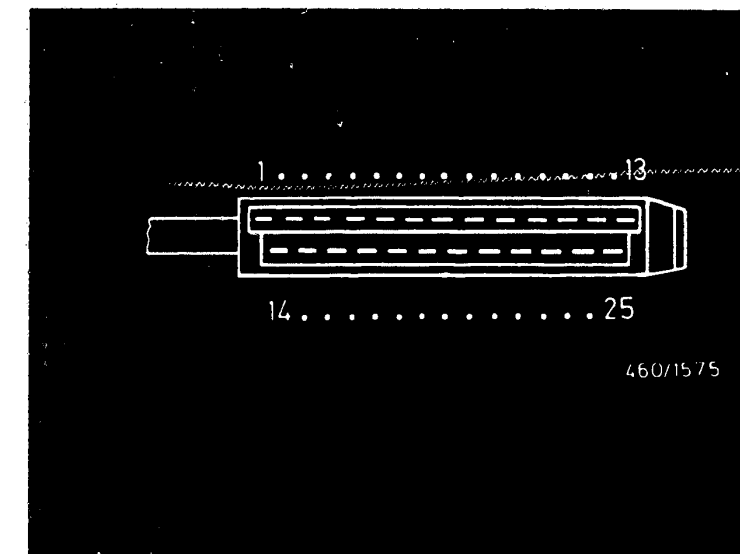
no

Intake-air temperature sensor defective.
Replace air-flow sensor.

End of test



1 = Air-temperature sensor



E9

Self-diagnosis test program

MB 124/126



E10

Self-diagnosis test program

MB 124/126



Flashing code: "10"

Component: Single trimming plug, exhaust-gas recirculation

Test 1: Cable connection, control unit to component.

Disconnect cable connector from control unit and test leads term. 3 and term. 18 to cable connector of single trimming plug with test leads for open circuit.

Jump sockets at cable connector of single trimming plug.

Set value: 0 Ω

no

Eliminate open circuit in lead.

yes

Test 2: Voltage supply

Ignition off. Disconnect cable connector. Connect voltmeter with commercially available test leads to cable-connector sockets 1 and 2.

Switch on ignition.

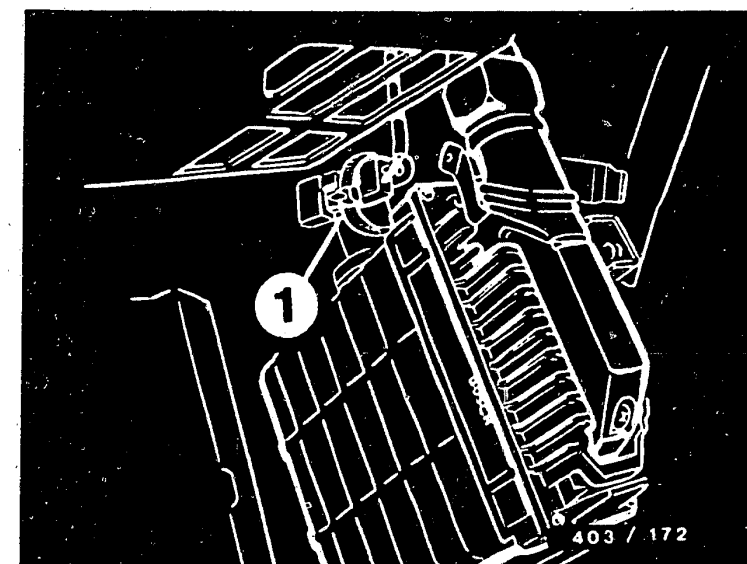
Set value: approx. 5 V

Is set value obtained?

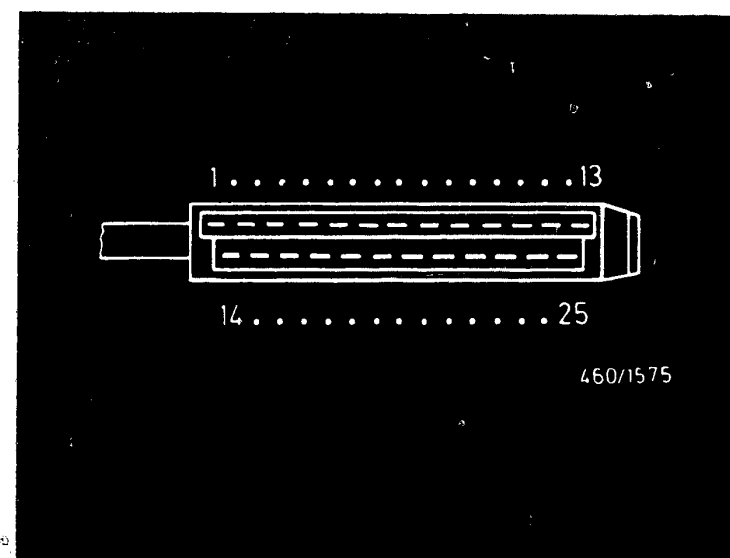
no

Replace trimming plug.
Note: when replacing the trimming plug, only plugs with the same Part No. may be installed.

End of test



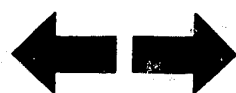
1 = Single trimming plug, exhaust-gas recirculation
Installation position: illustration, Type 126; Type 124 behind the battery



E11

Self-diagnosis test program

MB 124/126



E12

Self-diagnosis test program

MB 124/126



Flashing code: "11"

Component: Trimming plug,
(center illustration - arrow)
Low-idle-speed control

Test 1: Cable connection, control unit to
component.

Disconnect cable connector from control unit
and test term. 3 and term. 15 to trimming
plug with test leads for open circuit.
Disconnect trimming plug.
Jump socket 4 and ground reference (1).

Set value: 0 Ω

Is set value obtained?

no

Eliminate open circuit in lead.

yes

Test 2: Supply voltage

Ignition off.

Disconnect trimming plug.
Connect voltmeter with test leads
to socket 4 and ground reference.

Switch on ignition.

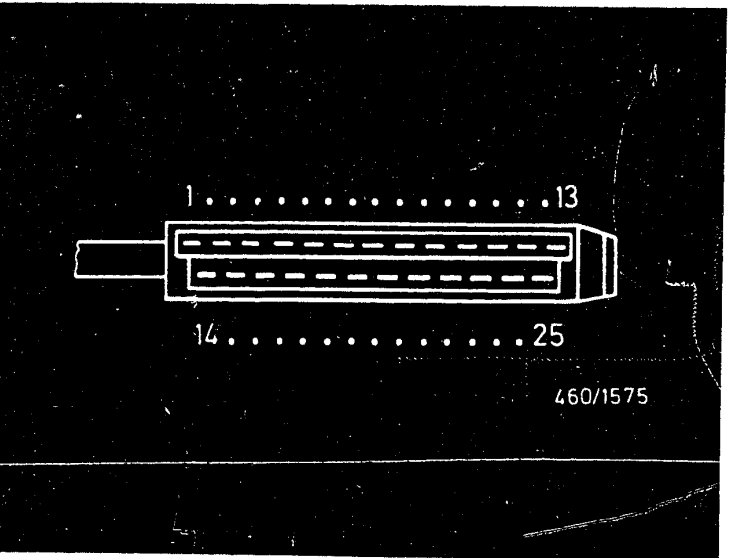
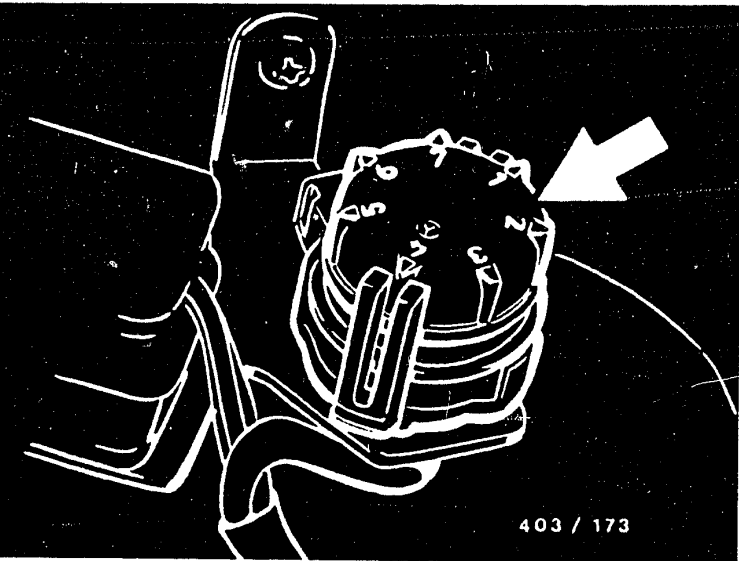
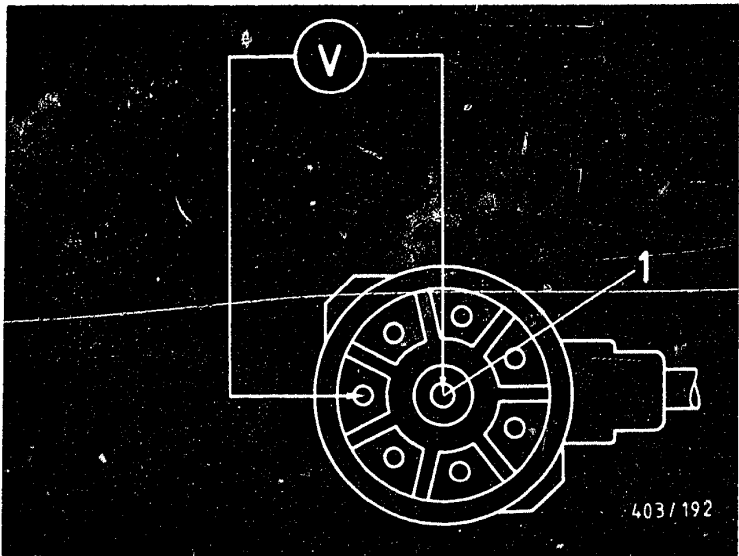
Set value: approx. 5 V

no

Replace trimming plug.

Note: insert trimming plug in
position 4.

End of test



E13

Self-diagnosis test program

MB 124/126

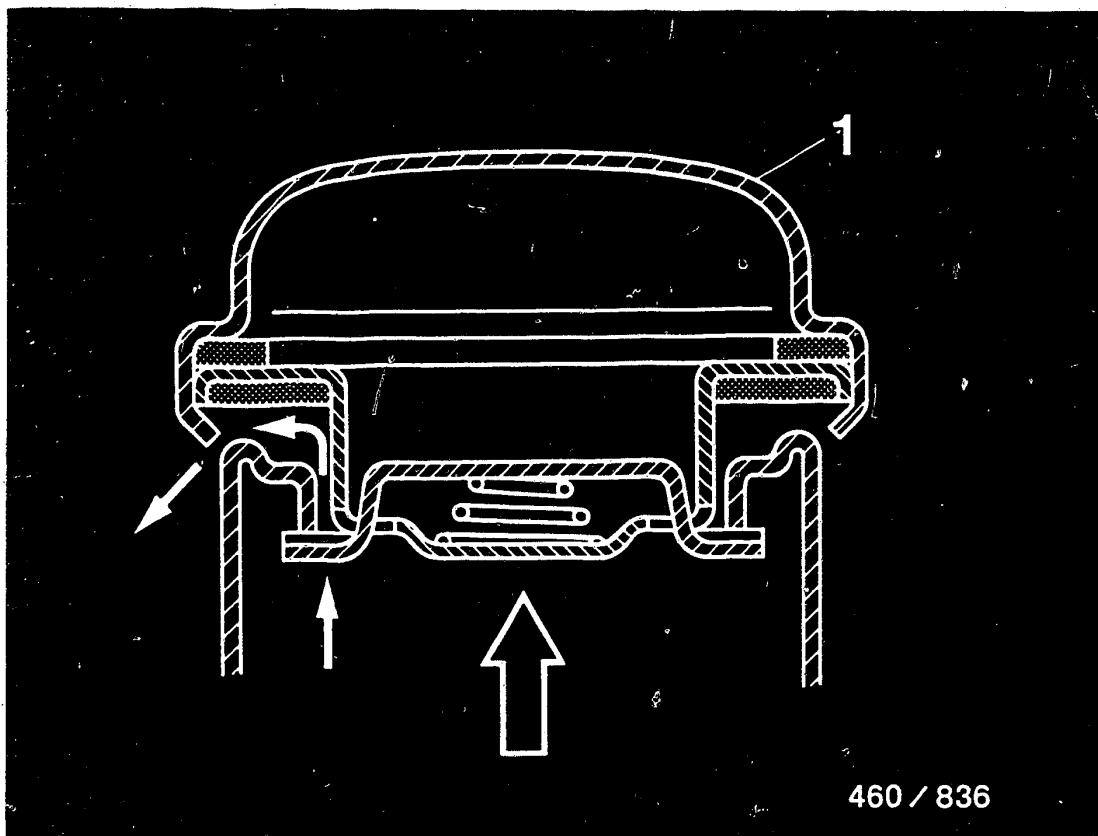


E14

Self-diagnosis test program

MB 124/126





1 = Filler cap

14. CHECK TANK VENT

Remove fuel filler cap.

If customer complaint disappears after removing filler cap, test ventilation system (filler cap and ventilation valve).

Note:

At 100 - 300 mbar gauge pressure, the fuel evaporation gases can escape through the filler cap.

E15

Check tank vent

MB 124/126



Test ventilation line of ventilation valve for clogging.

Ventilation line runs from central pipe downward through the fuel tank.

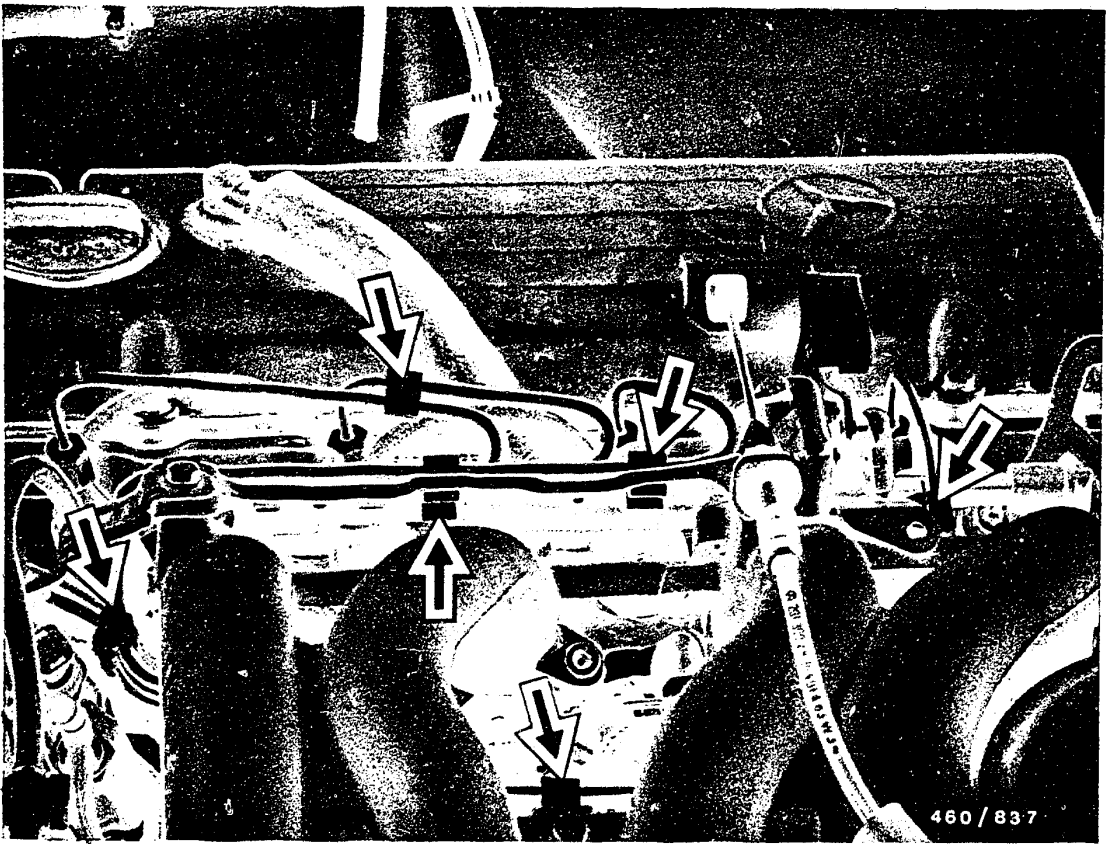
The ventilation valve is connected to the end of the ventilation line.

E16

Check tank vent

MB 124/126



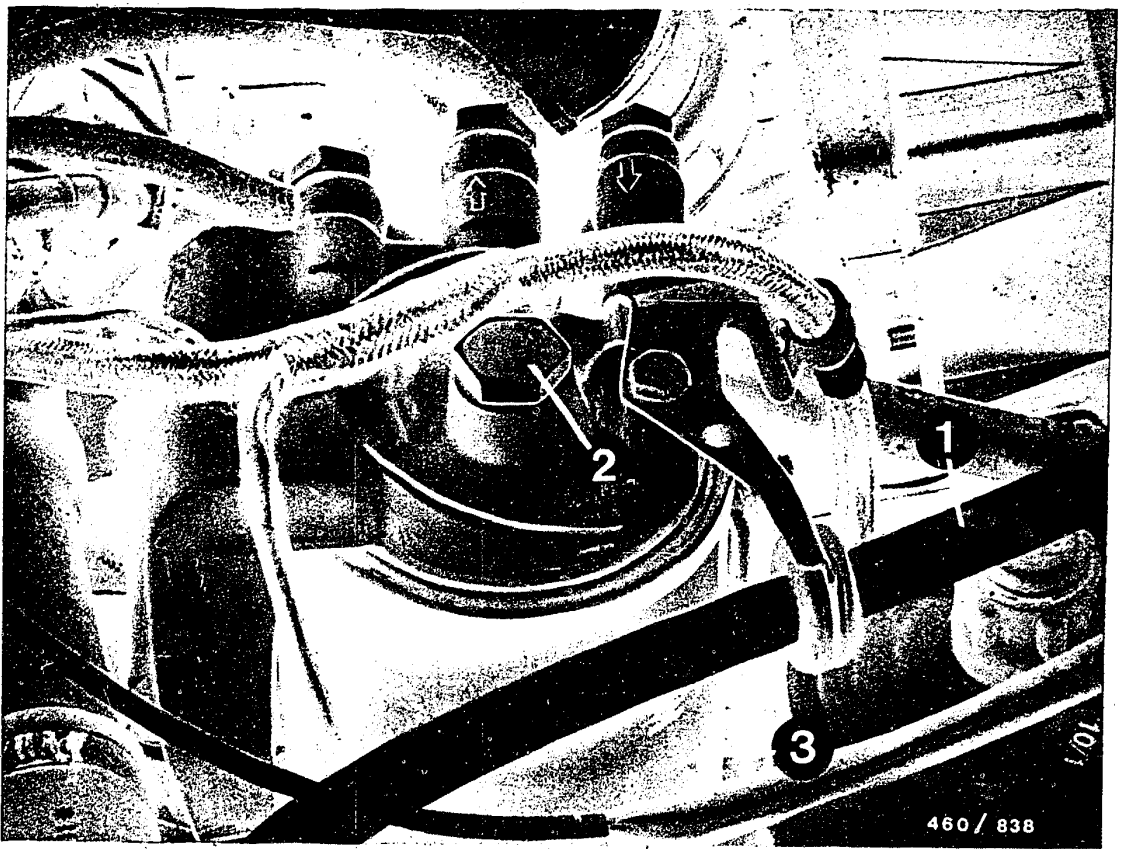


15. CHECK ROUTING OF FUEL-INJECTION TUBING

The fuel-injection lines are connected together by means of plastic clips (see picture, arrows) so that it is impossible to mix up the outlets.

If, nevertheless, there is doubt, check the routing of the lines according to the above picture.





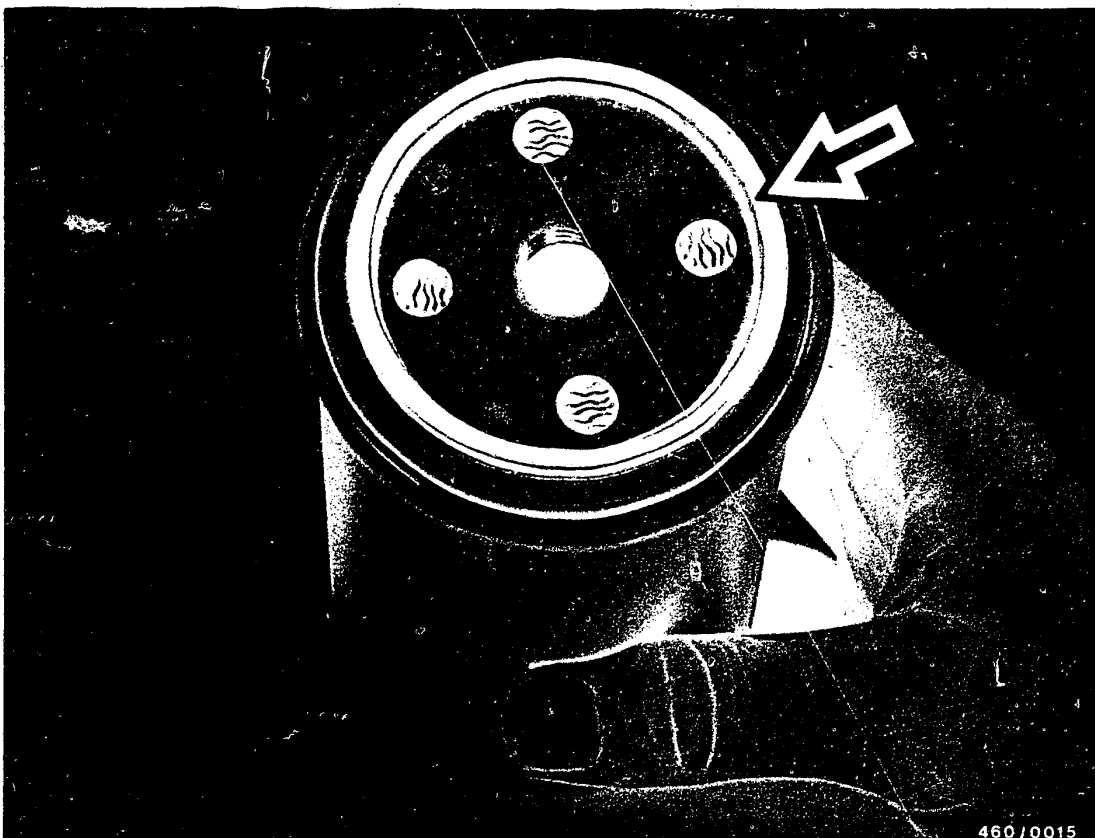
- 1 = Vacuum line
- 2 = Fastening screw for filter
- 3 = Filter

16. RENEW FILTER BOX

Unhook vacuum line.

Loosen fastening screw and remove filter downward.





460/0015

Rub diesel fuel into rubber seal (see picture, arrow) of new filter box.

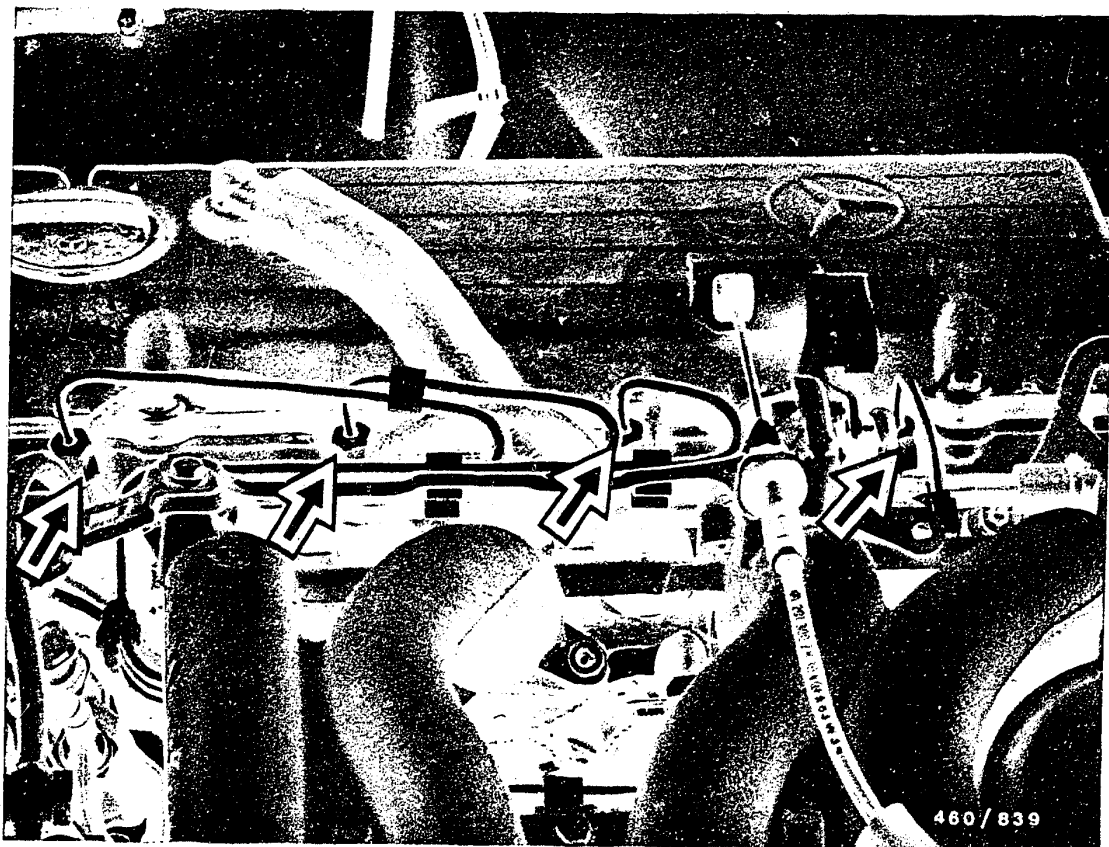
Screw filter box by hand into the cover and tighten. Test fuel filter for leaks (visual examination).

E19

Renew filter box

MB 124/126





17. TEST FUEL-INJECTION SYSTEM FOR LEAKS

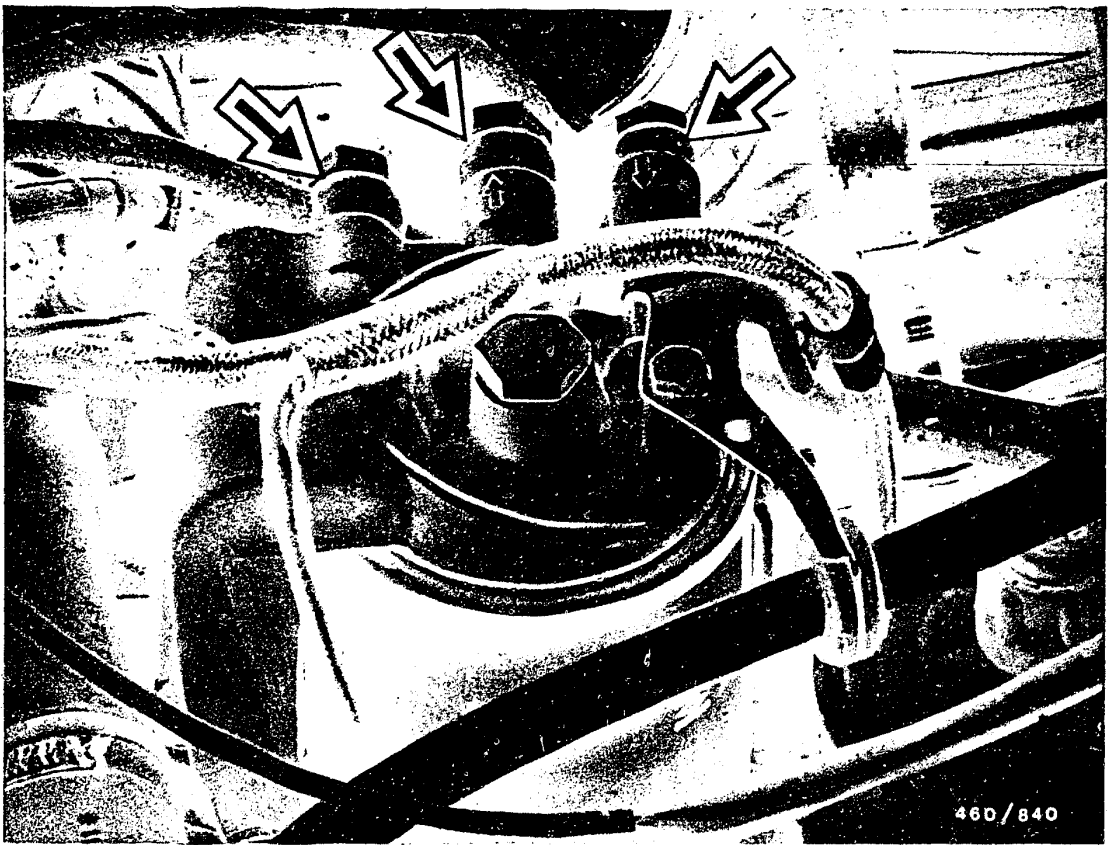
Leak test to be performed with engine at normal operating temperature.

Visually examine all connection points of fuel lines.

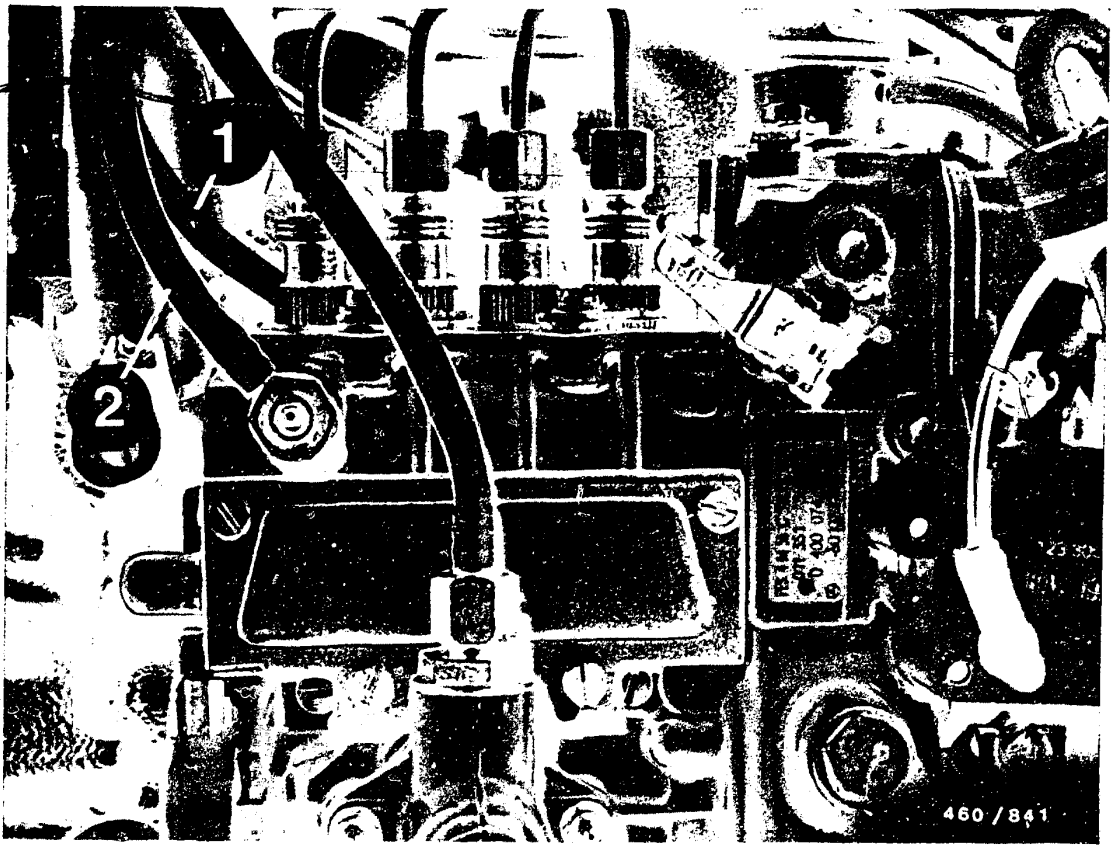
Pay particular attention to:

- connections of nozzle-holder assemblies (see picture, arrows).





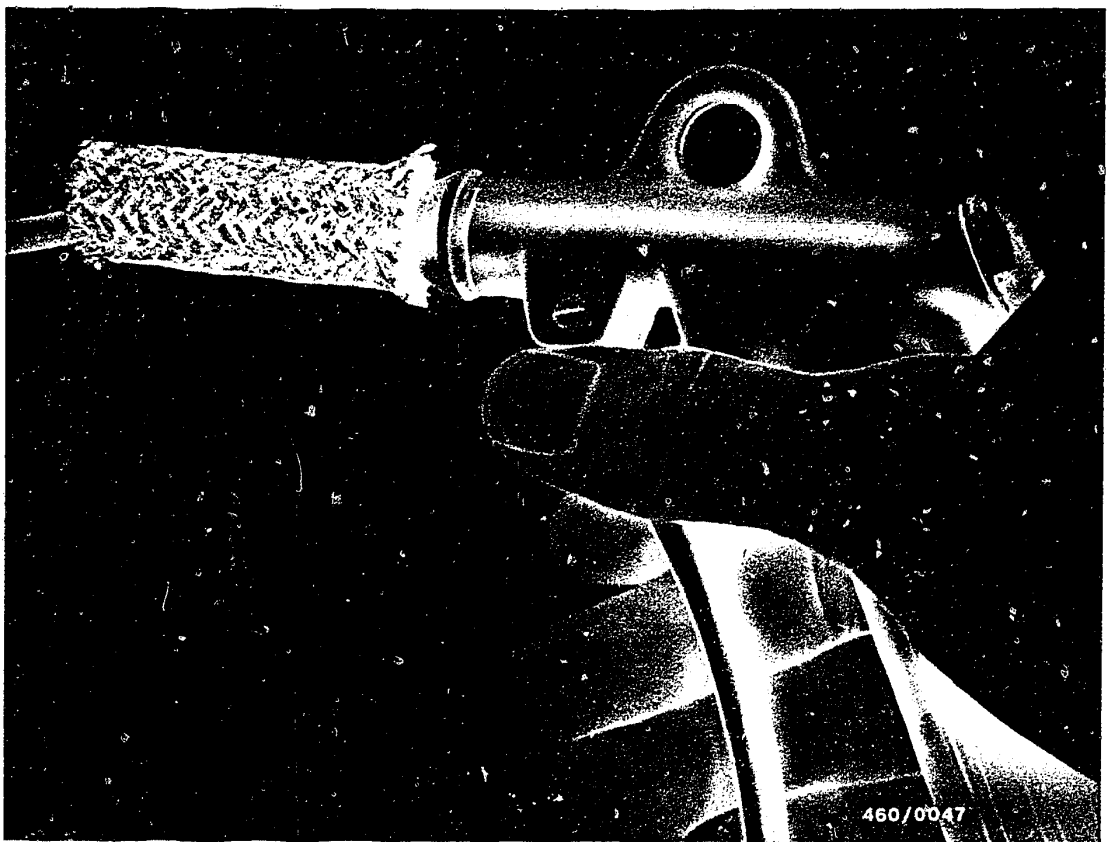
- Connections on fuel filter (see picture, arrows).



1 = Fuel inlet line
2 = Fuel return line

- Delivery-valve holders on the individual outlets
- Hairline cracks on fuel lines
- Inlet line and return line on injection pump





18. TEST FUEL LINES

Perform visual examination of suspect fuel lines.

If crushing or kinking is detectable, remove the fuel line in question.

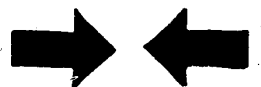
Test fuel line for throughflow with compressed air and clean if necessary.

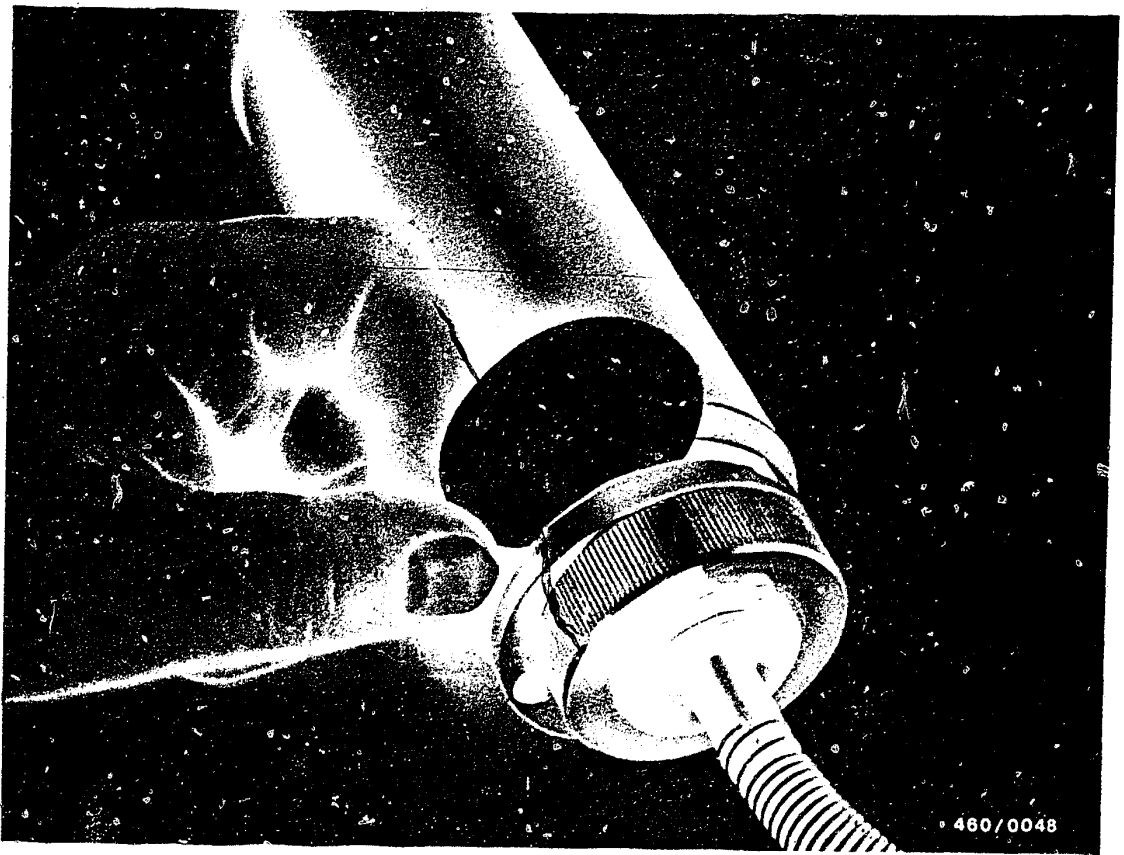
For blowing through the fuel lines, it is possible to use a suitable piece of hose to seal off the line at the sides.

E23

Test fuel lines

MB 124/126





19. SMOKE TEST - CHECK AIR FILTER

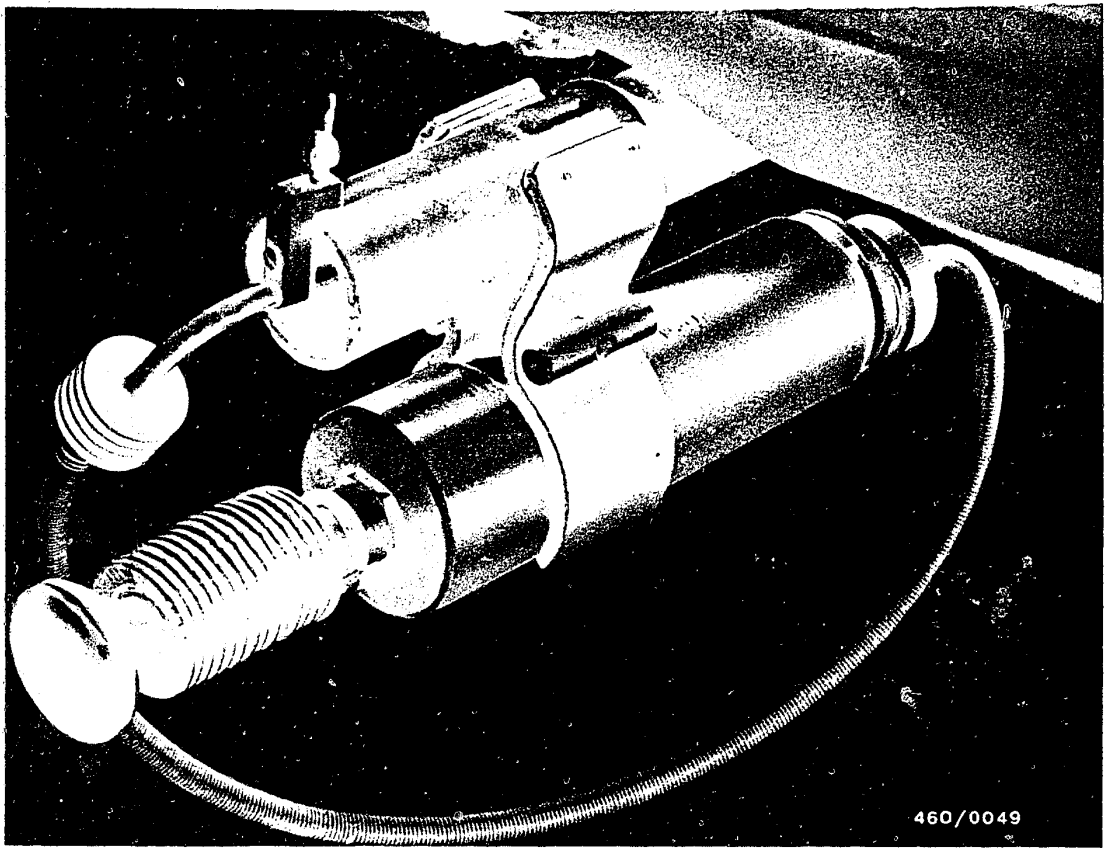
19.1 Test setup

The smoke test is conducted using the BOSCH smokemeter. The smokemeter consists of the following units:

- Accessories box with proportioning pump 0 681 169 038
or 0 681 169 058
- Evaluating unit 0 684 102 050

Insert filter plate into proportioning pump (with filter-type smokemeter 0 681 169 038).





Mount respective sampling pump on exhaust pipe using appropriate clamp.

Introduce exhaust-sample pickup as far as possible in to exhaust pipe and clamp in position.

F1

Smoke test

MB 124/126





19.1.1 Measurement in accordance with the steady-state method

Clamp proportioning pump by pressing the black push-button.

Take rubber ball on triggering hose and enter passenger compartment.

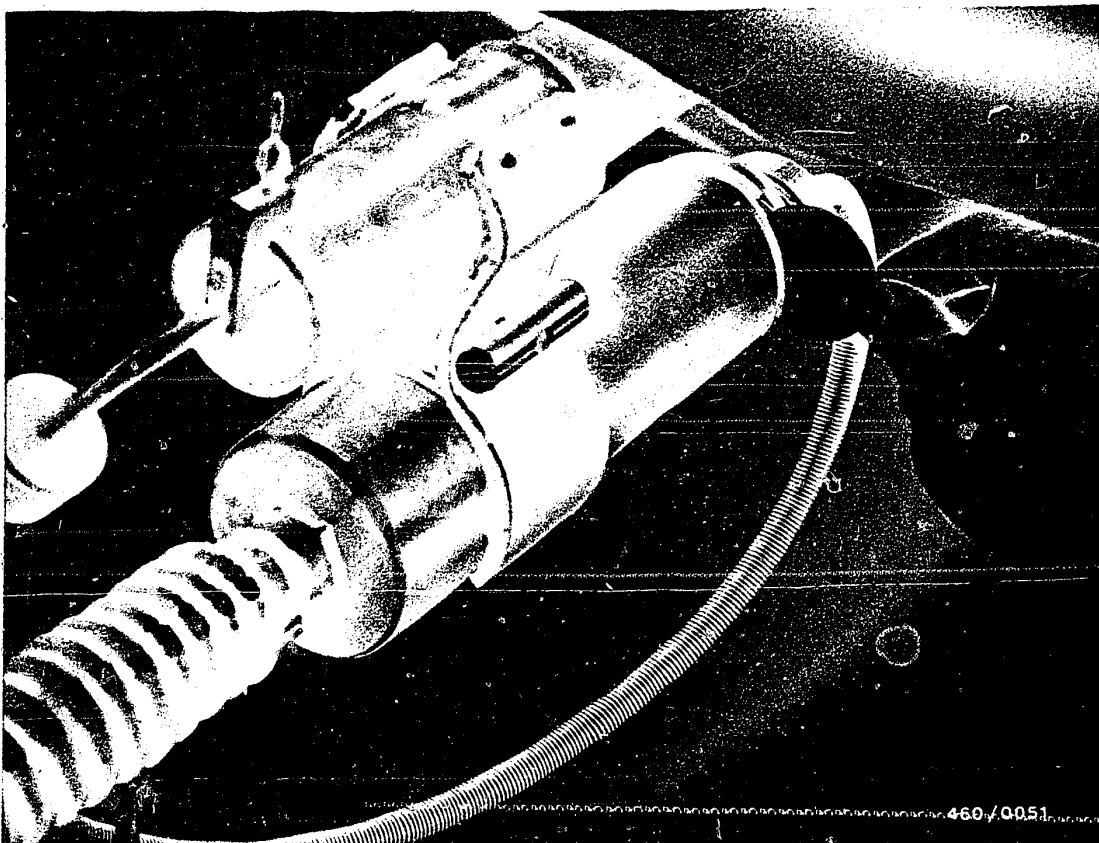
The test can be performed on the chassis dynamometer or on the road (gradient).

The chassis dynamometer is preferable in any case.

Find the gear in which, with the accelerator pedal in the full-load position, a speed of approx. 40 km/h is reached.

Load the engine so that, with the accelerator in the same position, a speed of approx. 25 km/h is reached.





Maintain this load condition for 5 seconds and then trigger the sampling pump by pressing the rubber ball.

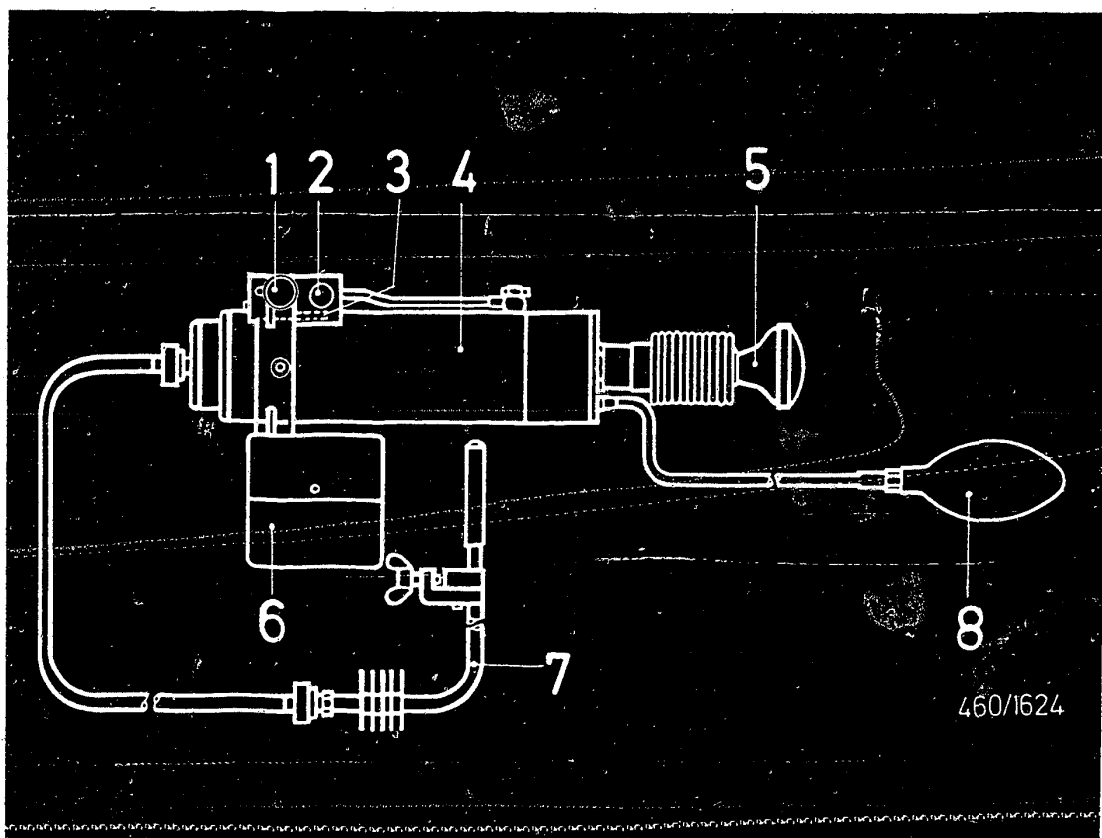
Switch off engine.

C A U T I O N !

During the following operation, pay attention to the fact that the exhaust pipe has been heated due to the running of the engine.

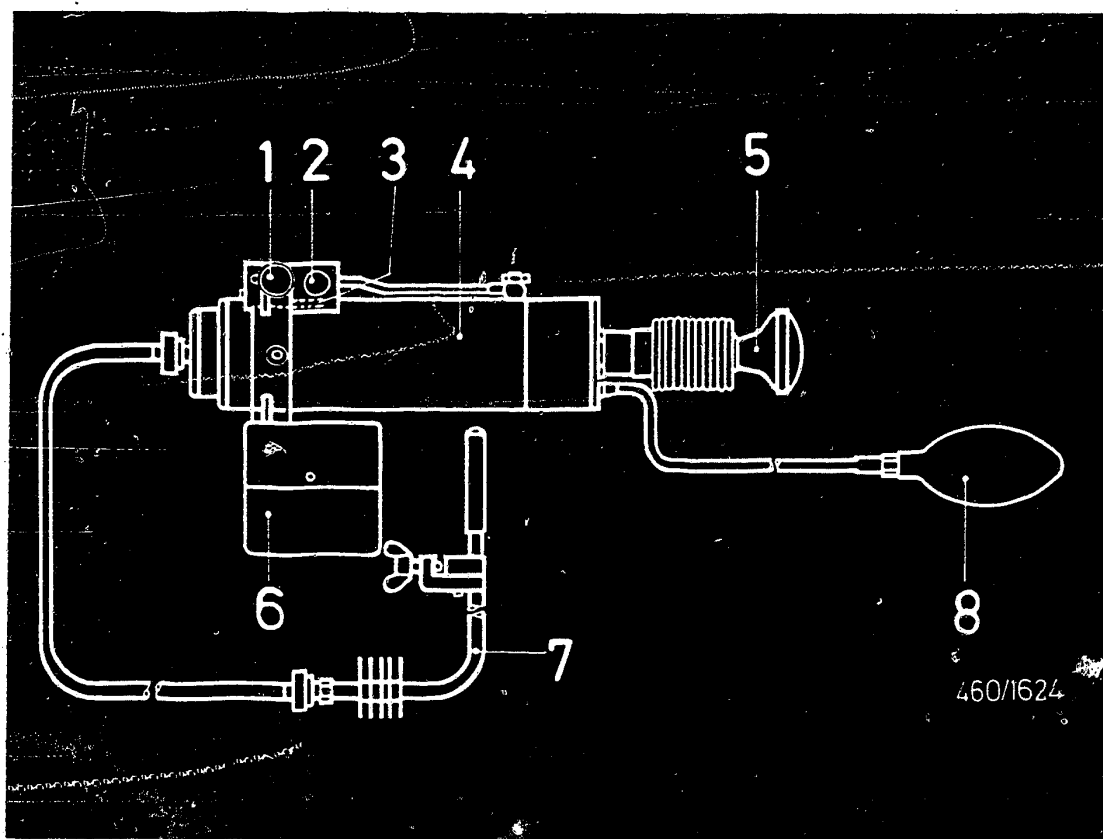
Remove filter plate from sampling pump.





- 1 = Rotary knob for paper transport
- 2 = Push-button for actuation via compressed air
- 3 = Compressed-air connection
- 4 = Proportioning pump
- 5 = Push-button for manual actuation
- 6 = Magazine for filter-paper roller
- 7 = Exhaust-sample pickup
- 8 = Rubber ball

19.1.2 Measurement in accordance with the acceleration method in conjunction with filter-type smoke meter 0 681 169 058.



Operating the proportioning pump:

The piston of the proportioning pump can be positioned to the operating position either by hand or with compressed air.

An appropriate connection (3) and a push-button (1) are fitted for actuation by compressed air.

Clamp the proportioning pump.

Test requirement:

In view of the handling and manual operation, we recommend that the measurements not be taken outdoors if it is raining or the air temperature is below 0° C.

The engine must be at normal operating temperature (coolant temperature at least 60° C) while conducting the measurement.

C A U T I O N !

During the following operations, pay attention to the fact that the exhaust pipe heats up due to the running of the engine.

Test procedure:

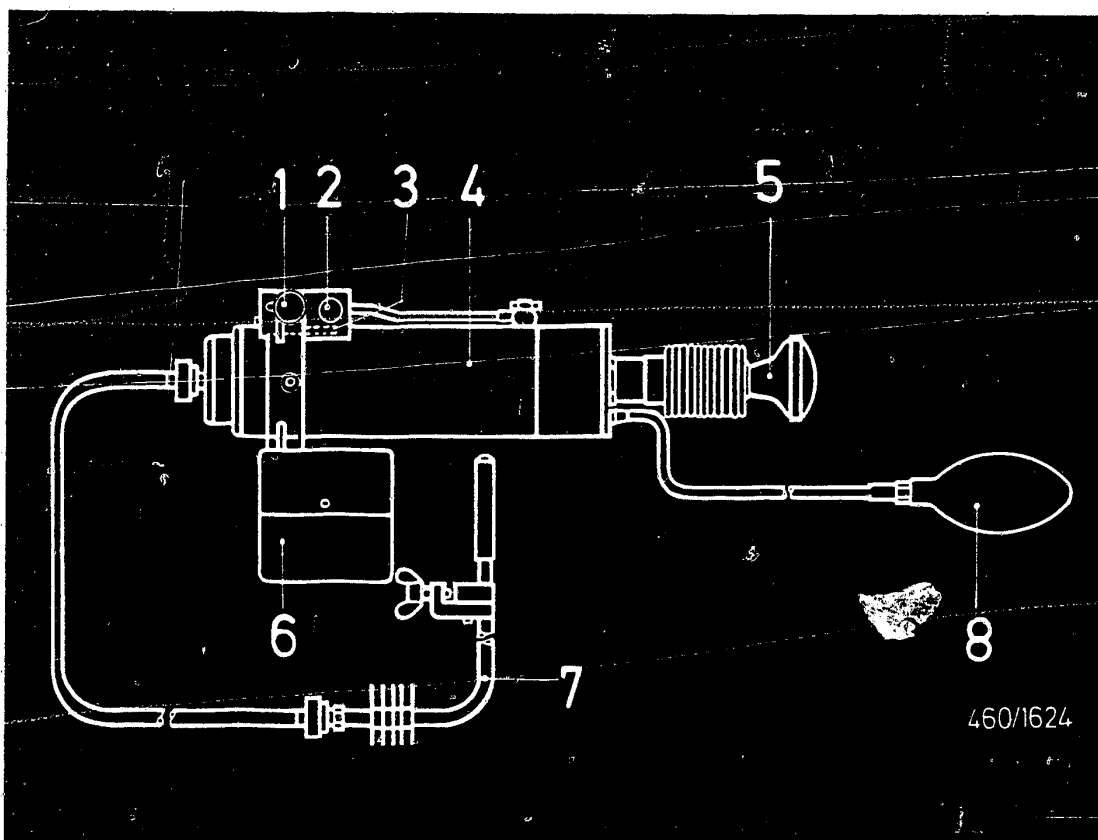
In order to clean the exhaust system, accelerate the engine to its breakaway speed at least three times rapidly in succession before conducting the measurement.

Approx. 1 second before the 4th acceleration, trigger the suction stroke of the proportioning pump by pressing the rubber ball.

Afterwards, rapidly depress the accelerator pedal fully to the floor until the maximum speed of the engine is reached and the governor of the injection pump regulates.

Once the breakaway speed is reached, immediately release the accelerator pedal (idle position).





- 1 = Rotary knob for paper transport
- 2 = Push-button for actuation via compressed air
- 3 = Compressed-air connection
- 4 = Proportioning pump
- 5 = Push-button for manual actuation
- 6 = Magazine for filter-paper roller
- 7 = Exhaust-sample pickup
- 8 = Rubber ball

By activating the push-button (2), the piston is returned to the operating position (when testing with compressed-air supply). Keep the push-button depressed until latching has taken place.

Transport the filter paper further by turning the rotary knob (1) one notch on (release and tensioning of the filter paper is performed automatically).

Repeat the measurement three times.

Position the piston to the operating position and tear off the measuring tape covered with soot.

With the acceleration measurement, as many individual measurements must be conducted until three successive test measurements with smoke numbers which do not deviate from one another by more than 1 Bacharach unit are obtained.

Note:

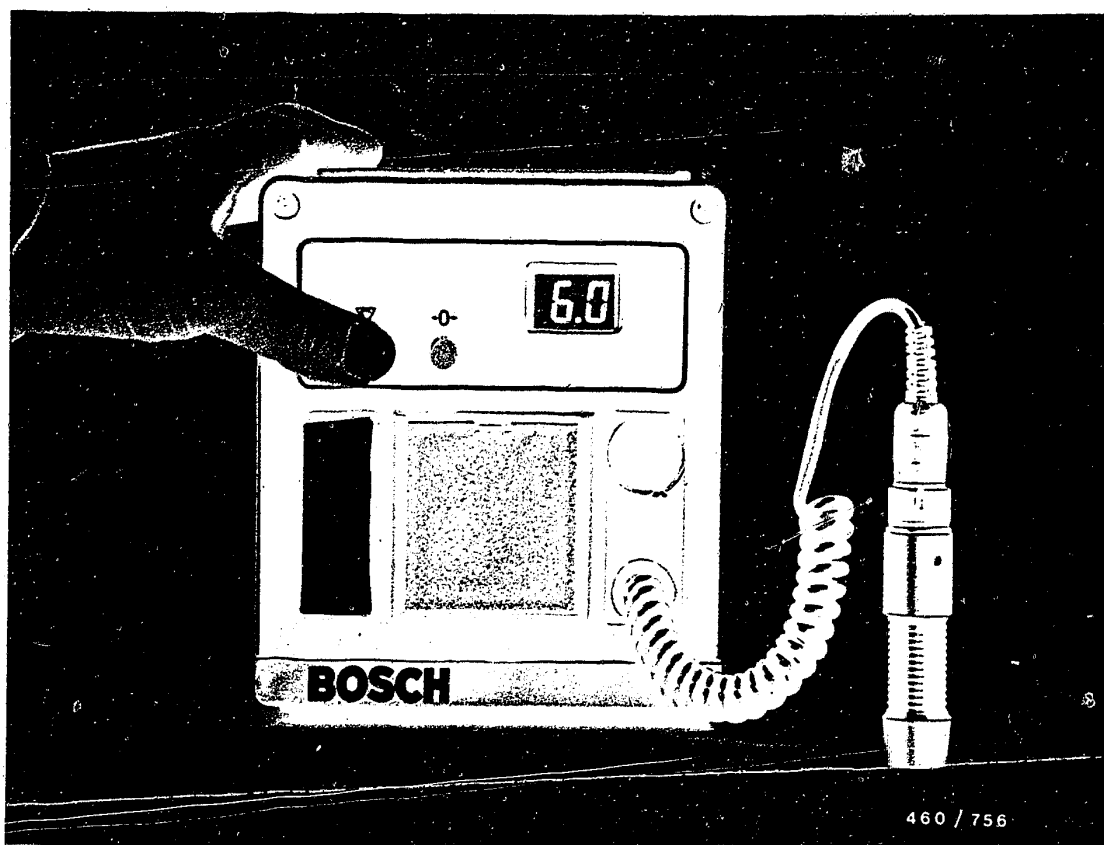
In the case of engines with selectable supercharging, the complete series of measurements must be performed with supercharging selected.

F8

Smoke test

MB 124/126





Evaluating the filter plates

Carry out zero adjustment of the evaluating unit.

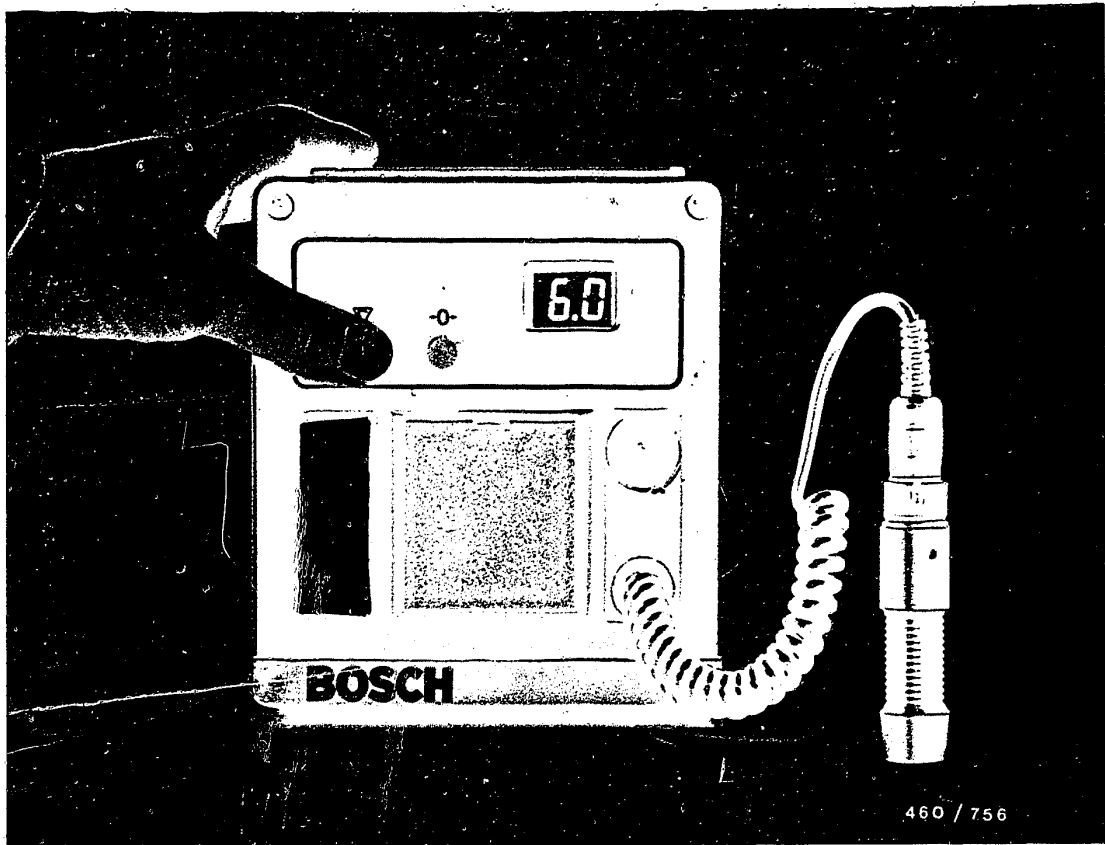
The zero point adjustment must be performed

- before each series of measurements
- in case of changes in ambient conditions
- whenever the lens of the photoelement adapter has been cleaned.

Firmly press measuring head of photoelement adapter onto 5 clean white filter plates placed one on top of the other.

Press button "0" until display 0.0 appears.
Release button "0".





Measuring

Place filter plate from sampling pump - with sooted side to the top - on 3 new filter plates placed one on top of the other.

Press measuring head vertically onto black surface of filter plate, simultaneously pressing button "C" until the measured smoke number appears on the display.

Note:

Measuring head must be firmly pressed down both for the zero point adjustment as well as when measuring (even slight tilting can lead to incorrect measurements).

Compare smoke number with evaluation sheet.

Note kW (hp-din) data of vehicle manufacturer.



19.2 Check air filter

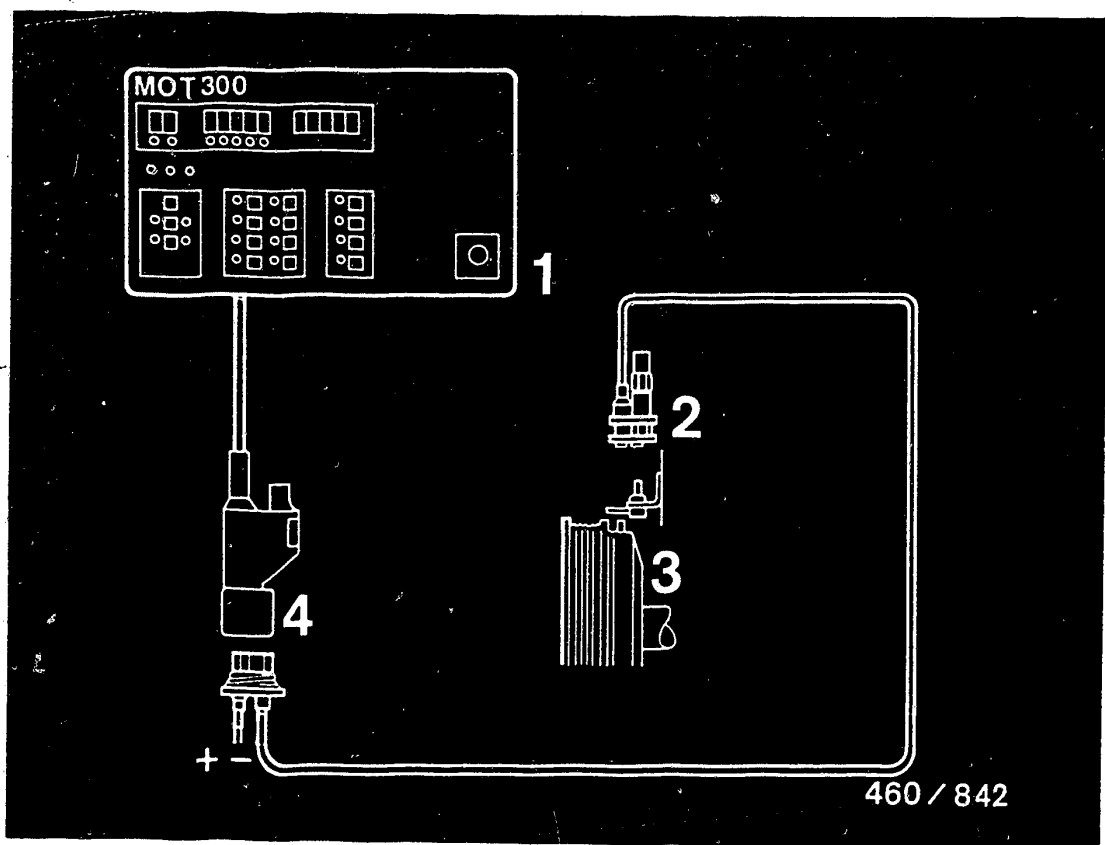
Remove air filter and subject to a visual inspection.

Test criteria for air filter:

- dusty air filter
- oiled-up air filter
- solid matter in air filter, e.g. leaves

If in doubt, use new filter element.





1 = Tester
 2 = TDC sensor (is installed)
 3 = Pulley
 4 = Adapter lead

20. TESTING THE IDLE SPEED AND ADJUSTING WITH MOT 300 OR DIESELTESTER

Adapter lead to MOT 300,
 Bosch Part No.: 1 684 463 094
 Adapter lead to dieseltester,
 Bosch Part No.: 1 684 463 147



Test conditions

- Battery voltage min. 11.5V
- Selection-lever position "P"
- Air conditioner switched off
- Bowden cable must be connected to reverse-transfer lever without tension
- Engine-coolant temperature > 60° C.

Test procedure

Engine running at idle.
Encoding-plug position "4"

Set value: 610 – 650 min⁻¹

Note:

If complaint about poor idling, the idle speed can be adjusted individually.

Encoding-plug in position	Idle speed min ⁻¹
1	545 – 585
2	570 – 610
3	590 – 630
4	610 – 650
5	630 – 670
6	650 – 690
7	675 – 715

Idle speed O.K.?

yes

1. Test step (testing servo magnet)

- Disconnect plug from servo magnet on injection pump.

Reconnect plug, engine speed must increase.

If engine speed does not increase, apply 12 V (only briefly, approx. 3 s., otherwise servo magnet defective).

See upper illustration.

If idle speed does not increase, servo magnet defective – replace.

To do this, use tightening tool KDEP 1573 (take care of shims when removing and installing).

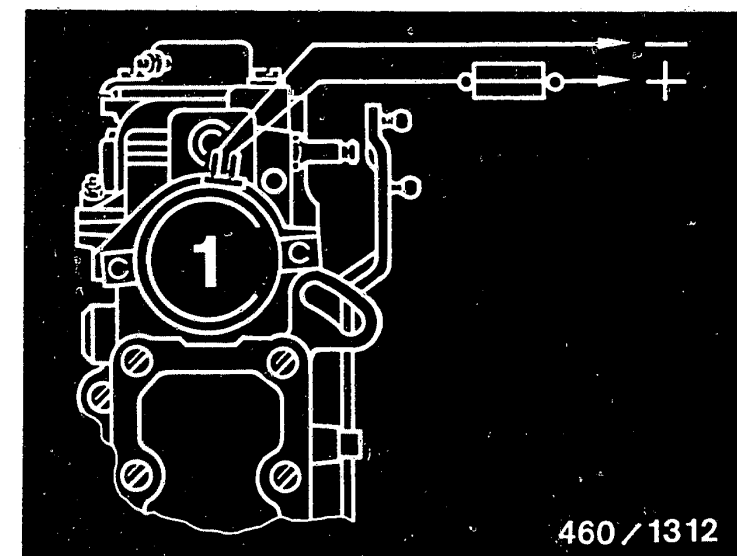
- Test ungoverned idle speed. (Plug disconnected from servo magnet)

Set value: 530 – 610 min⁻¹

2. Test step (testing overvoltage protection)

1. Engine switched off. Ignition switched on. Test using voltmeter whether approx. battery voltage is available at the two contacts of the fuse on the overvoltage protection.

Replace defective fuse.

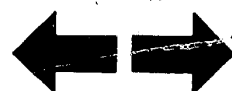


460/1312

F13

Test electron. low-idle-speed control

MB 124/126



F14

Test electron. low-idle-speed control

MB 124/126



Continued

yes

2. Test lead from multiple butt connector of engine term. 30, lead from plug-in connection of engine term. 15, and lead from battery ground in each case to overvoltage protection terminals 1, 6 and 5 for open circuit (see upper illustration). Eliminate open circuit. If no fault under Point 1 and no open circuit under Point 2, replace overvoltage protection.
3. Test lead from overvoltage protection term. 2 to control unit (servo magnet and pressure transducer of EGR) for open circuit. Eliminate open circuit.

Check uncontrolled idle-speed.
Disconnect plug from servomagnet.
Uncontrolled idle-speed should be:

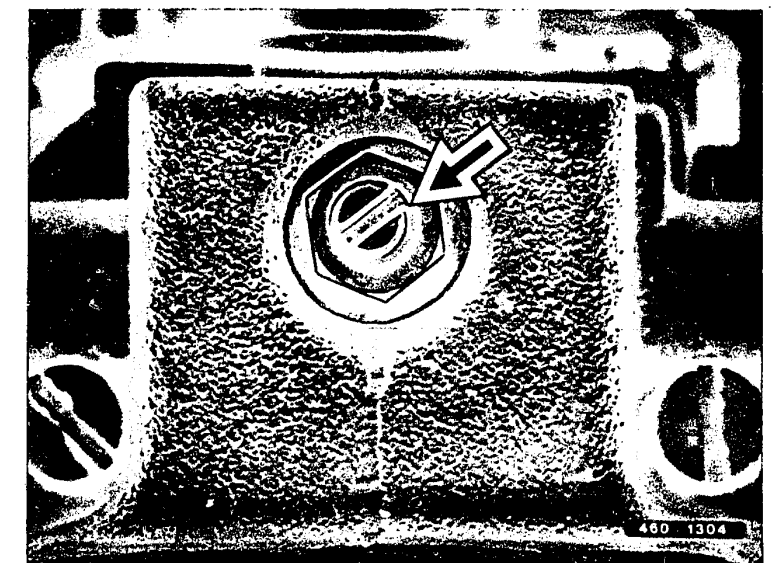
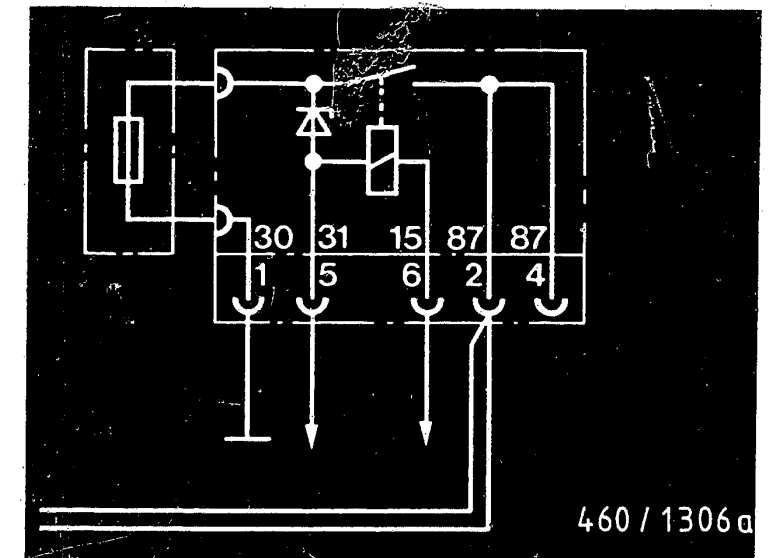
Set value: 530 - 610-1
Idle speed O.K.?

no

Adjust idle speed at adjusting screw on injection pump (see arrow, bottom picture) after loosening the lock nut.

yes

Testing completed.
Electronic idle-speed control
O.K.



F15

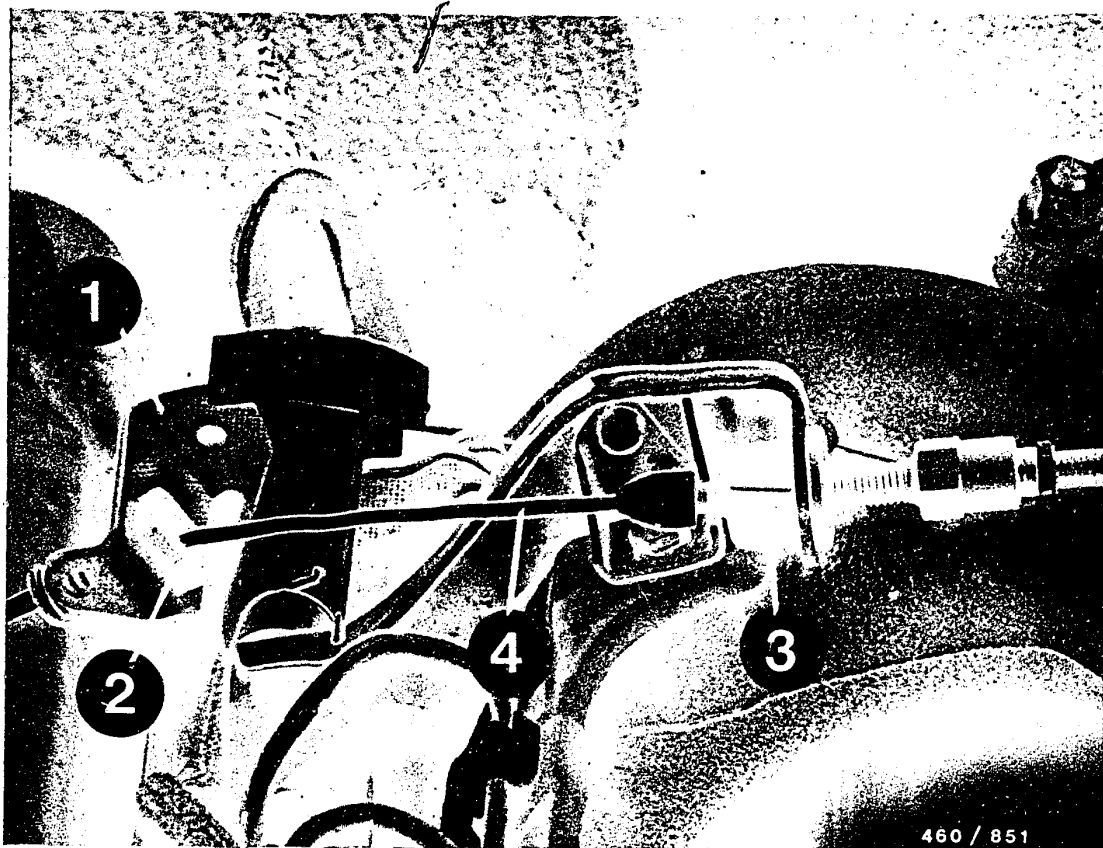
Test electron. low-idle-speed control
MB 124/126



F16

Test electron. low-idle-speed control
MB 124/126





- 1 = Bell crank
- 2 = Guide piece
- 3 = Expansion clamp
- 4 = Cable

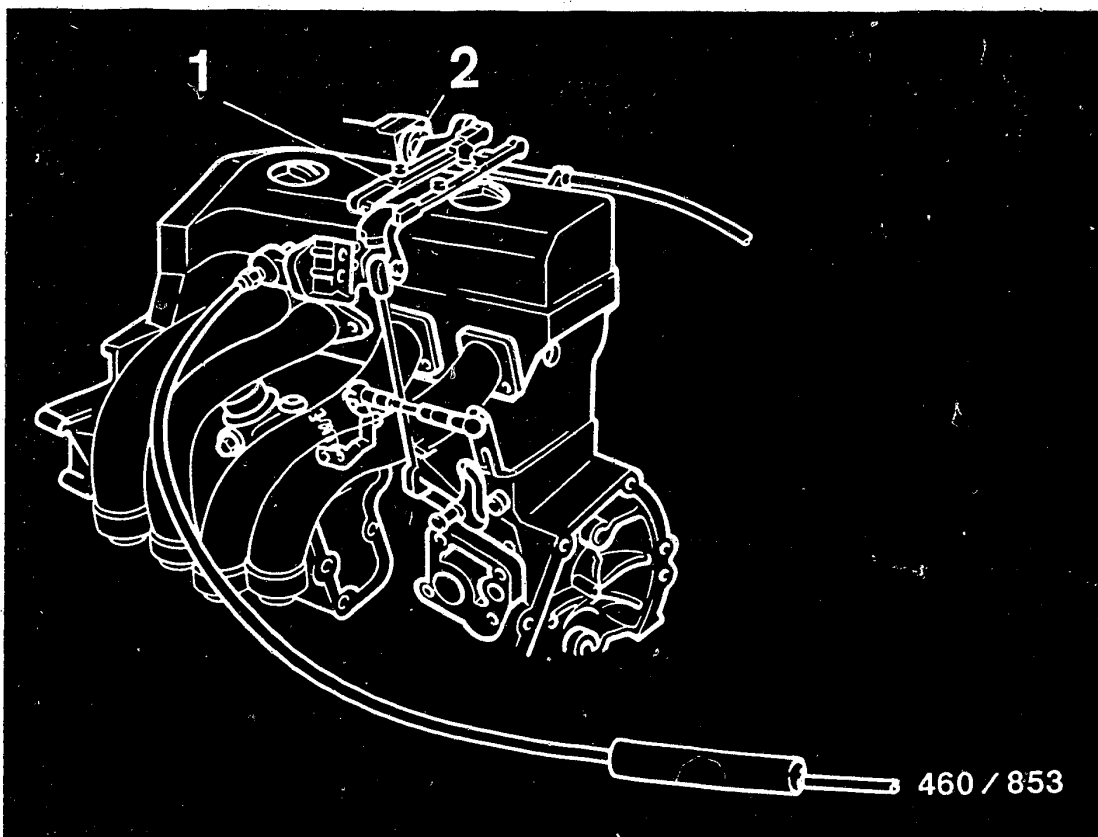
21. ADJUST ENGINE-SPEED REGULATION MECHANISM TYPE 124

Check regulating linkage for damage (deformation) and wear; check cable for freedom of movement. Renew defective parts.

Note:

Press out slotted guide piece on bell crank. Press together expansion clamp, as a result of which cable can be unhooked and removed.





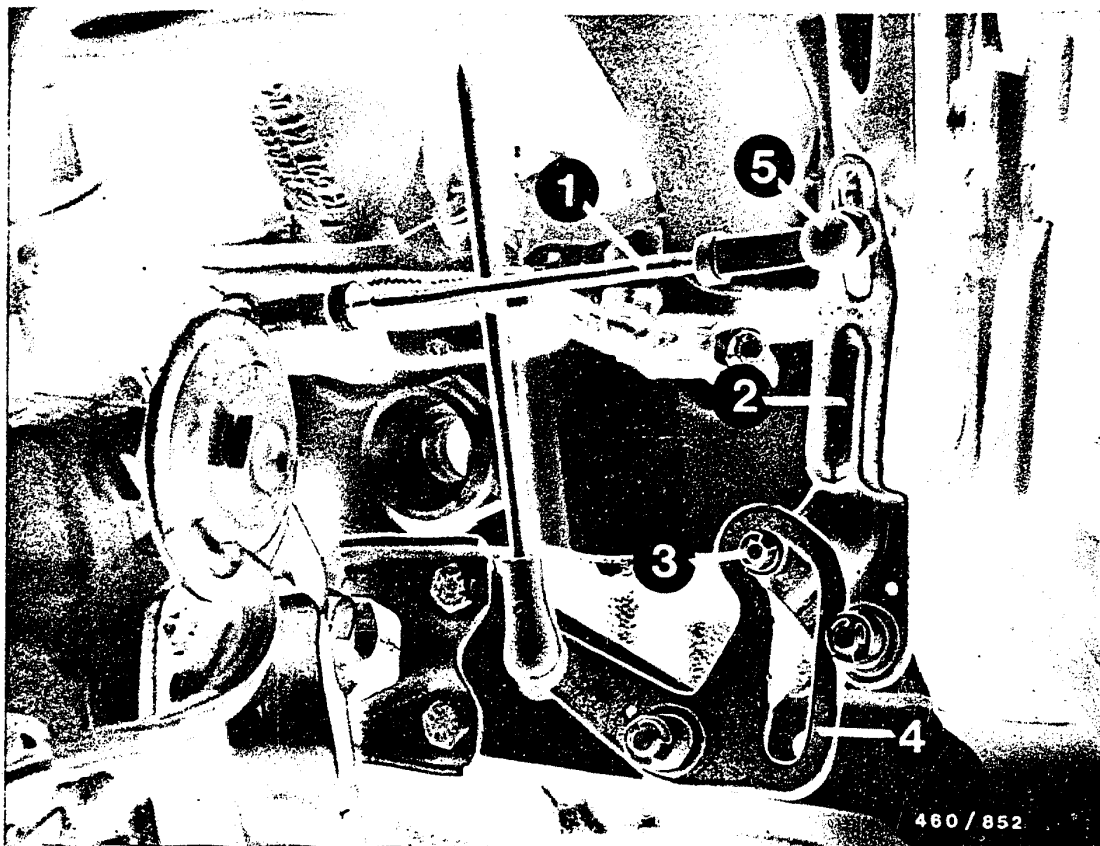
1 = Connecting rod

2 = Cruise control

21.1 Test and adjust idle stop on vehicles with manual transmission

Check whether control lever of injection pump is up against idle stop. To do this, unhook connecting rod on cruise control.





1 = Connecting rod
2 = Deflection lever
3 = Roller

4 = Variable-fulcrum lever
5 = Ball head (adjustable)

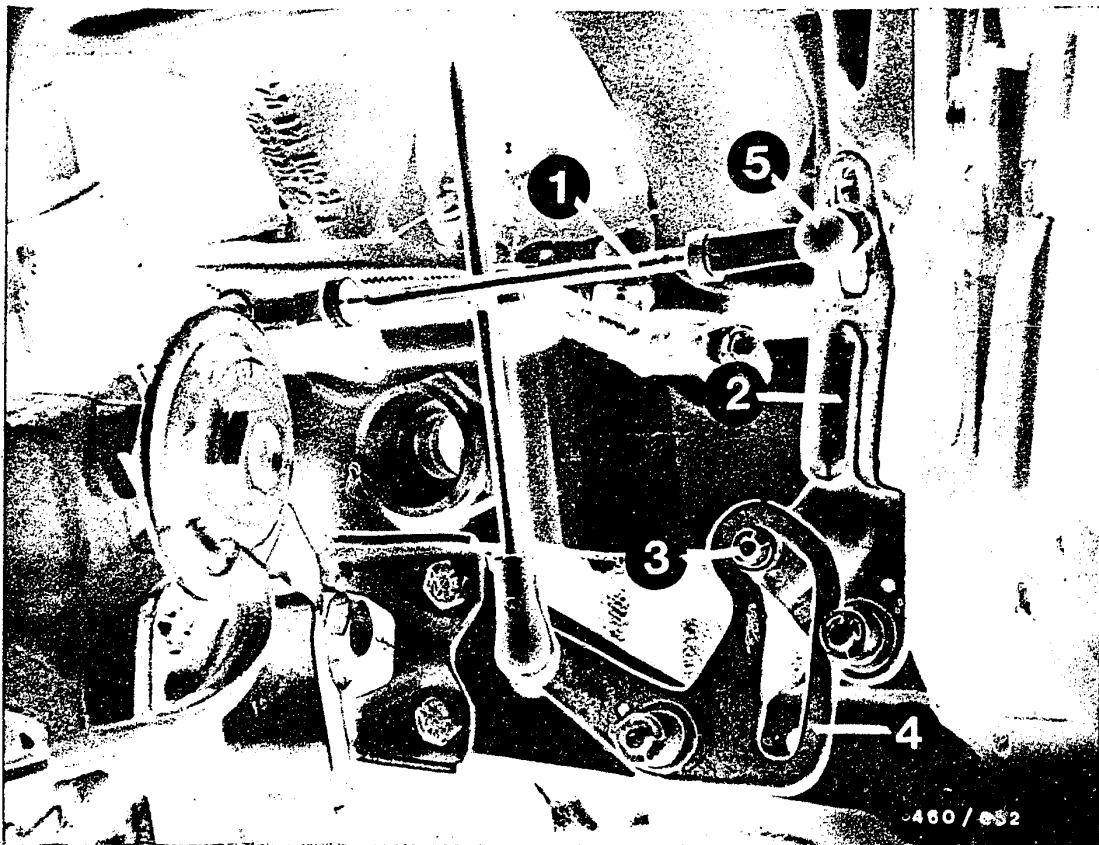
21.2 Test and adjust idle stop on vehicles with auto- matic transmission

Unhook adjustable connecting rod on deflection lever. Check whether control lever of injection pump is up against idle stop.

Hook in connecting rod free of tension. Make sure that roller in variable-fulcrum lever is up against end stop free of tension (see picture). If necessary, adjust connecting rod.

Setting dimension of connecting rod from centre of ball head to centre of ball head = 146 ± 8 mm.



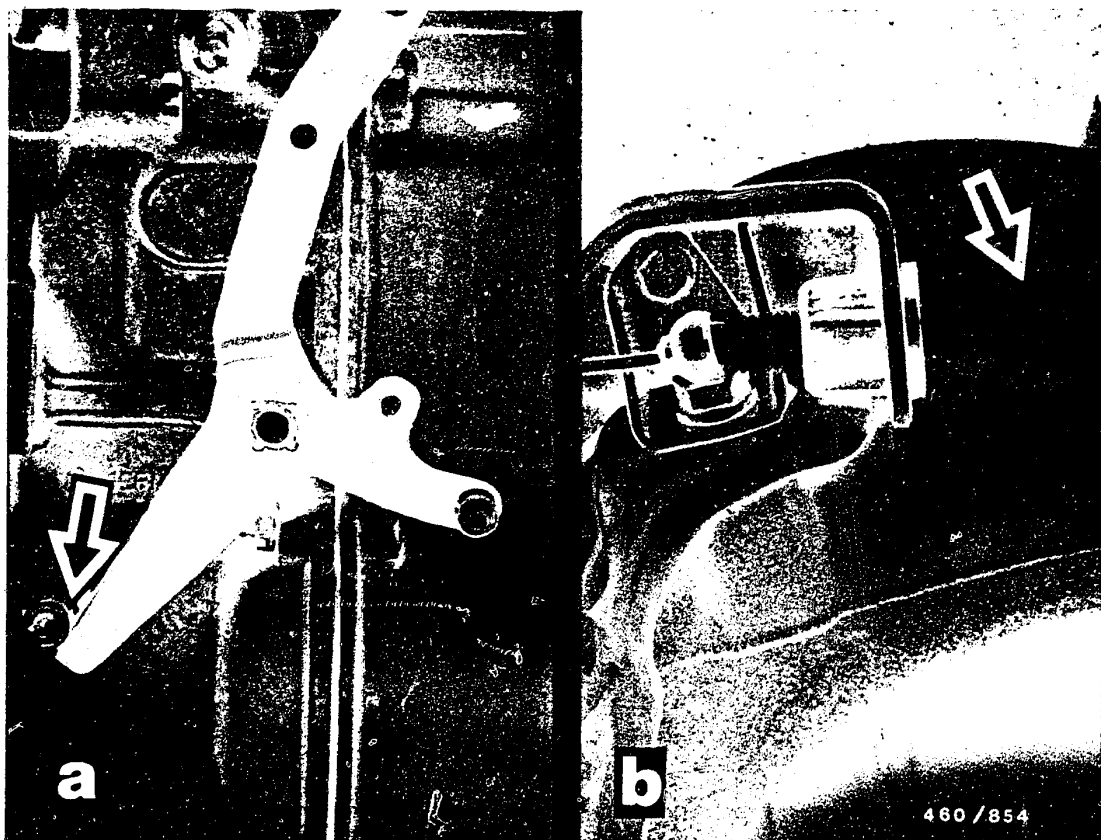


1 = Connecting rod
2 = Deflection lever
3 = Roller

4 = Variable fulcrum lever
5 = Ball head (adjustable)

Pull variable-fulcrum lever to full load. Injection-pump control lever must be up against full-load stop. If control lever is not up against full-load stop, loosen adjustable ball head, slide in deflection lever slot and lock again.





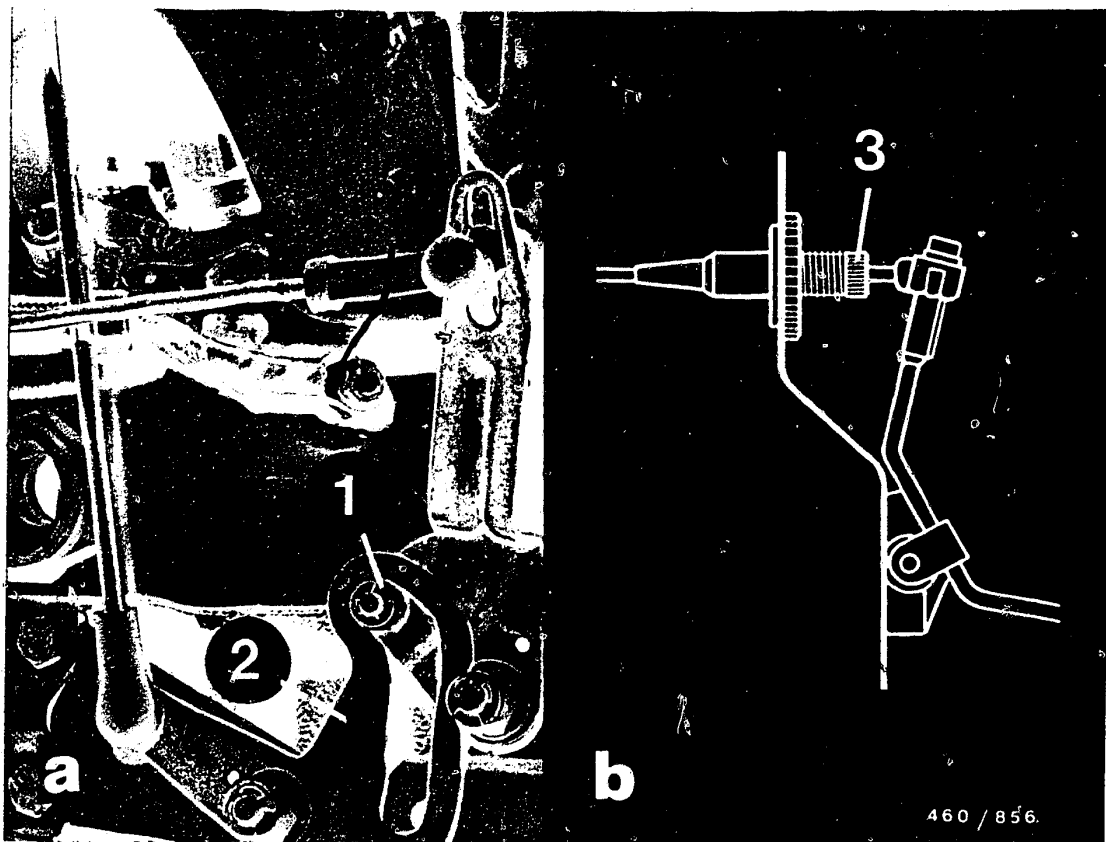
21.3 Test and adjust full-load stop on vehicles with manual and automatic transmission

With engine stopped, press accelerator in passenger compartment as far as full-load stop or, in case of automatic transmission, as far as stop on kickdown switch.

Injection-pump control lever must be up against full-load stop (arrow, picture a).

Check by pressing the connecting rod. If necessary, adjust by means of adjusting screw (arrow, picture b) on cable.

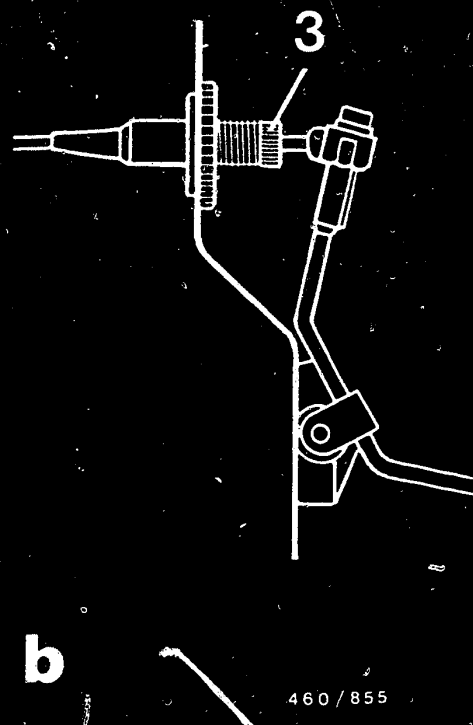
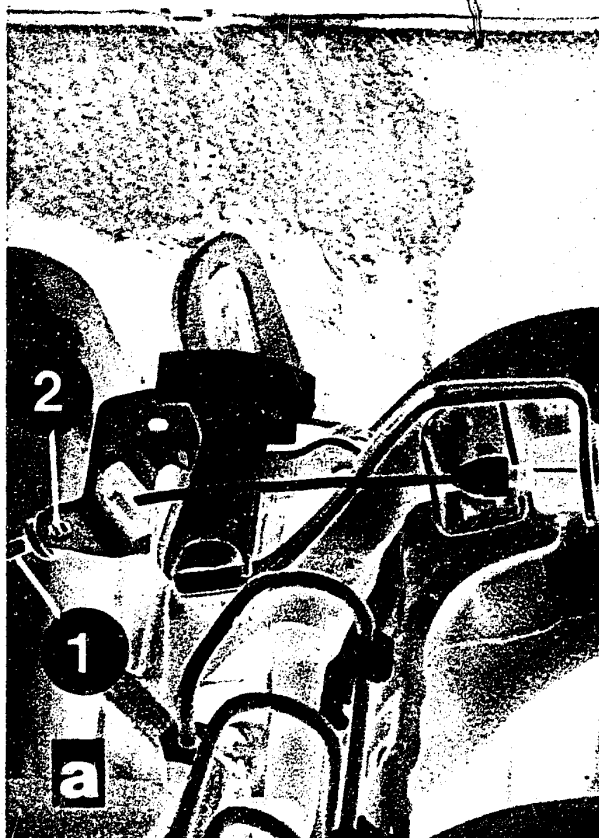




- 1 = Roller
- 2 = Variable-fulcrum lever
- 3 = Adjusting nut

Slowly ease off accelerator from full-load position into idle position. In this position, the roller in the variable-fulcrum lever must be up against end stop free of tension (see picture a). If necessary, correct adjustment in passenger compartment by means of adjusting nut (picture b).





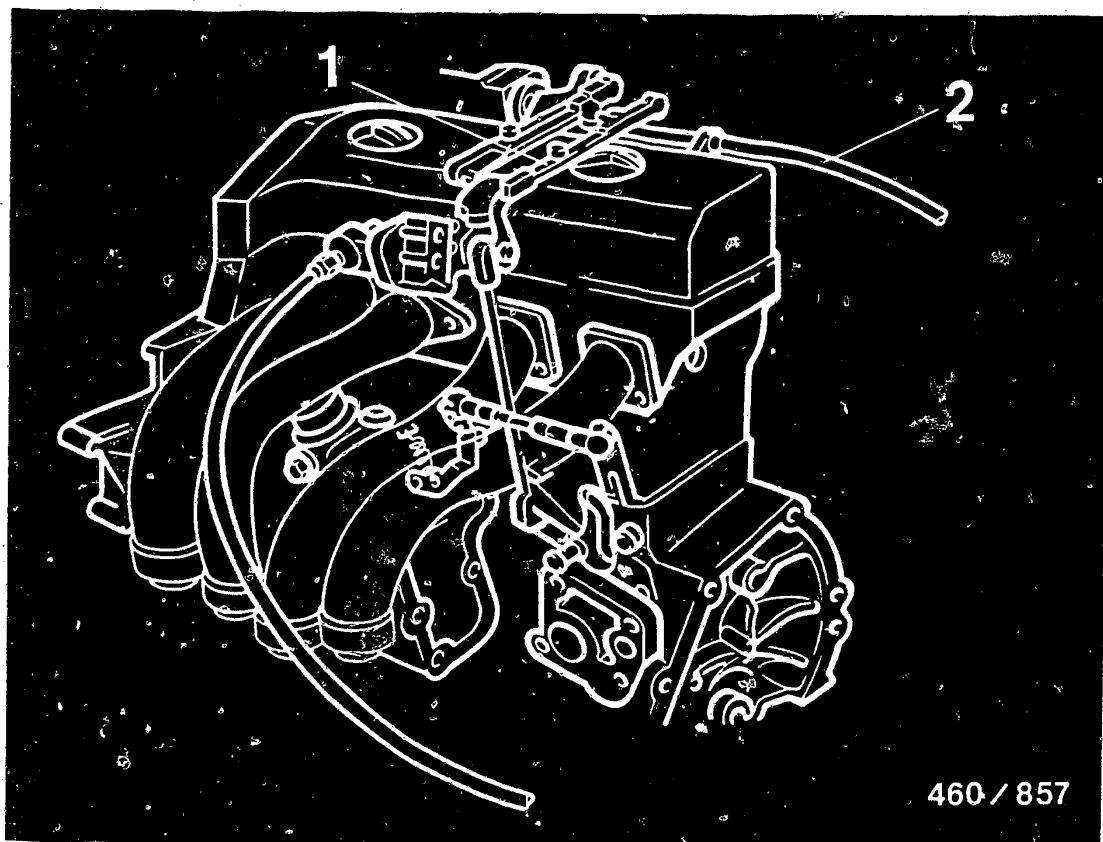
460/855

- 1 = Cable nipple
- 2 = Compression spring
- 3 = Adjusting nut

In the idle position, the nipple of the cable must be up against the compression spring free of tension (picture a).

If necessary, appropriately adjust cable from passenger compartment by means of adjusting nuts.





460 / 857

- 1 = Idle travel rod
- 2 = Control pressure cable

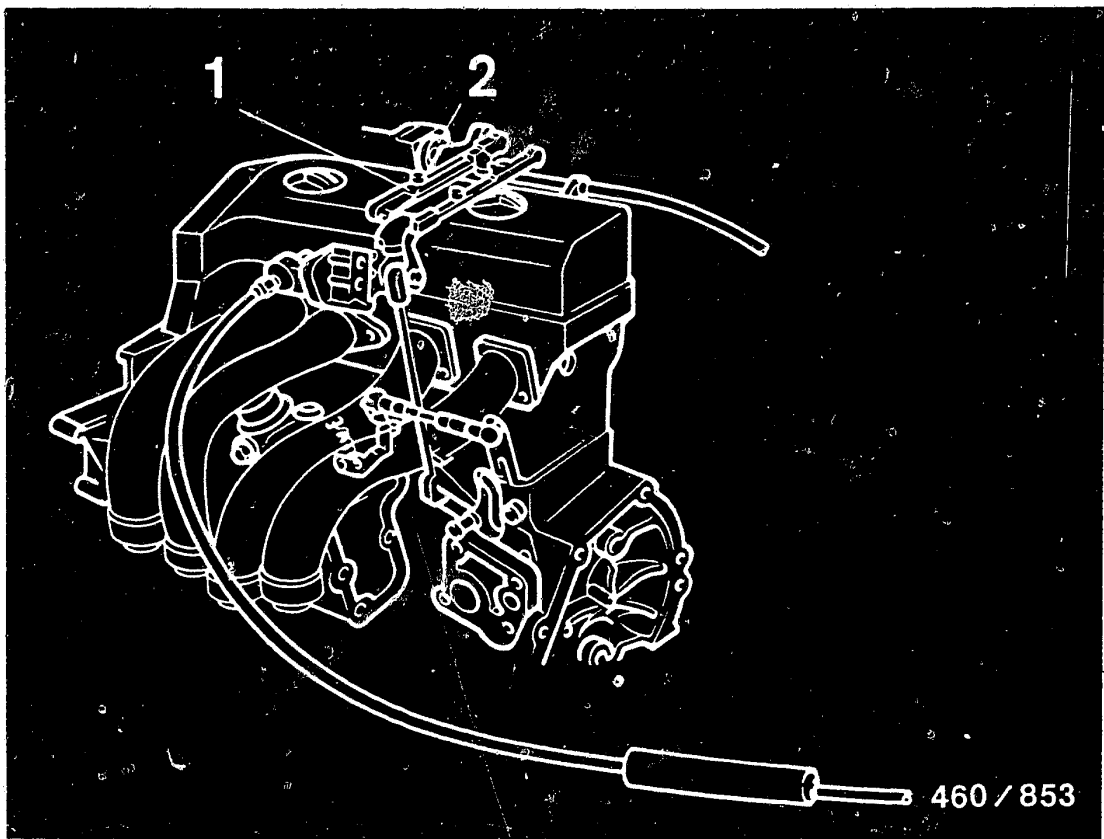
21.4 Adjust control pressure cable

Unhook control pressure cable ball socket. Extend idle travel rod as far as it will go. Pull control pressure cable forward until slight resistance can be felt.

In this position, hold ball socket over ball head and hook in free of tension.

If necessary, move idle travel rod to do this.





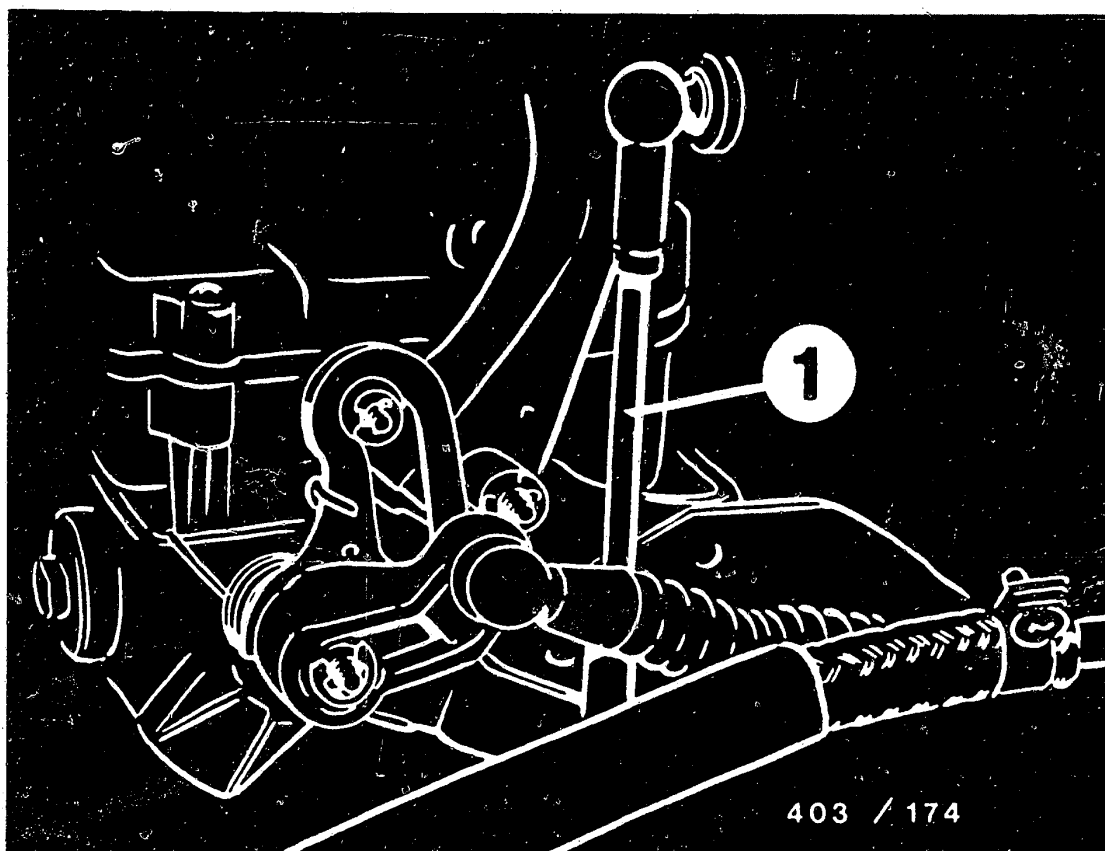
- 1 = Connecting rod
- 2 = Cruise control
- 3 = Deflection lever

21.5 Adjust cruise control

Unhook connecting rod on actuator and press deflection lever into idle position.

Adjust length of connecting rod so that it is 1 mm shorter than the actual maximum gap. Hook in connecting rod and lock.





403 / 174

1 = Connecting rod

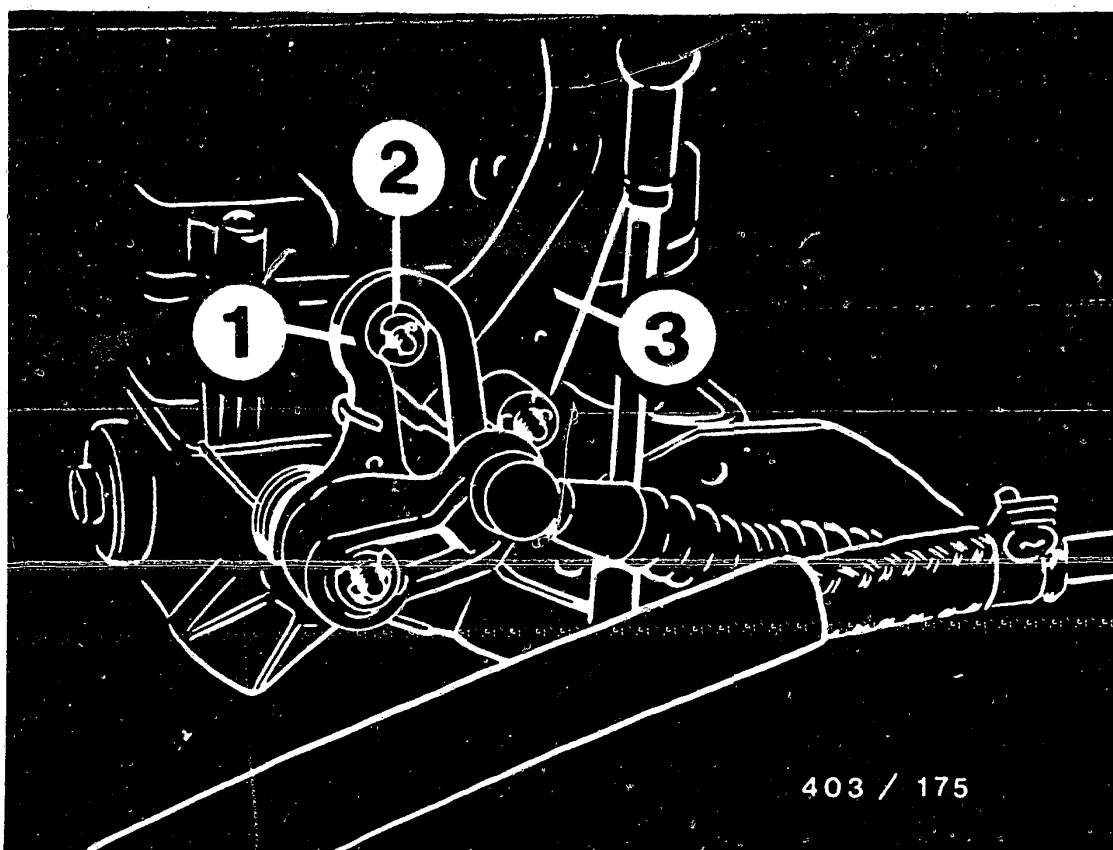
22. ADJUSTING THE MECHANICS OF THE ENGINE-SPEED REGULATION - Type 126

Check regulating linkage for damage/deformation and wear, and bowden cable for freedom of movement. Replace defective components.

22.1 Testing idle stop in vehicles with automatic transmission and adjusting Type 126

Check regulating linkage for warping.
Unhook connecting rod.



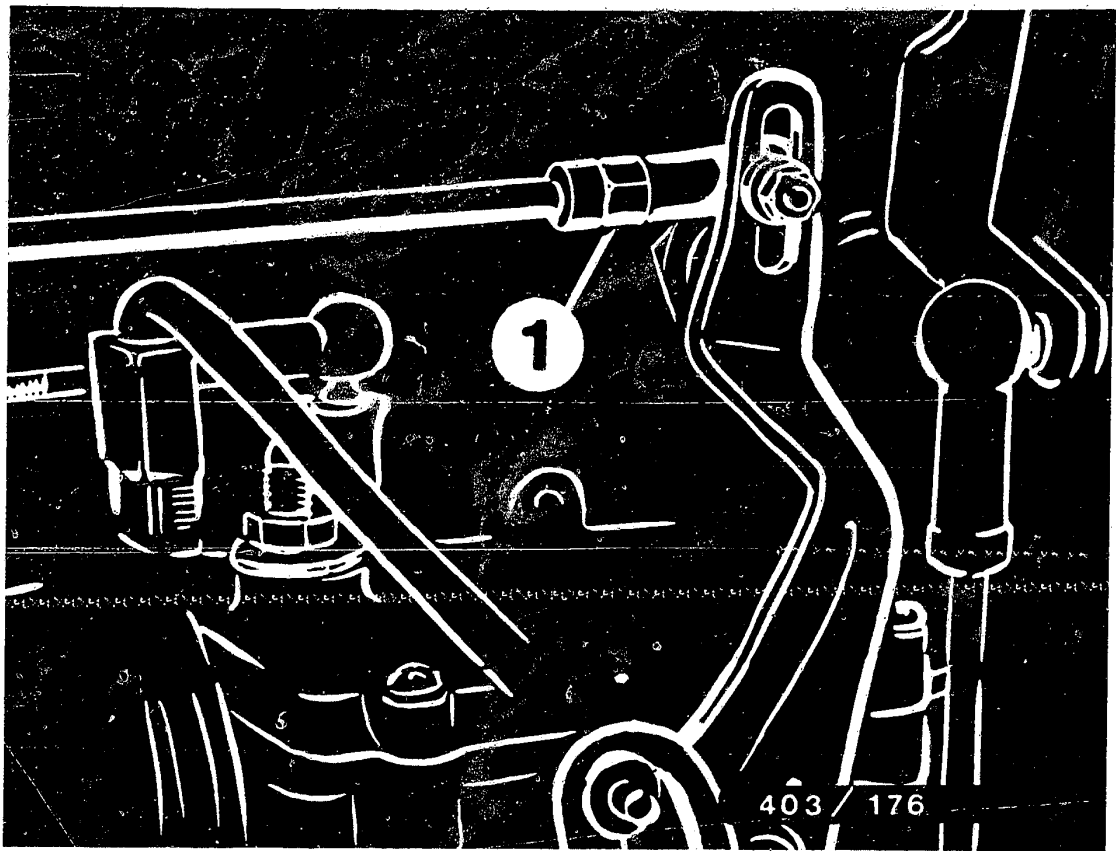


403 / 175

- 1 = Variable-fulcrum lever
- 2 = Roller
- 3 = Reverse-transfer lever

Check whether control lever of the injection pump can be felt to make contact with the idle stop.
Hook in connecting rod without it being under tension.
When doing this, make sure that the roller in the variable-fulcrum lever makes contact with the end stop without it being under tension.

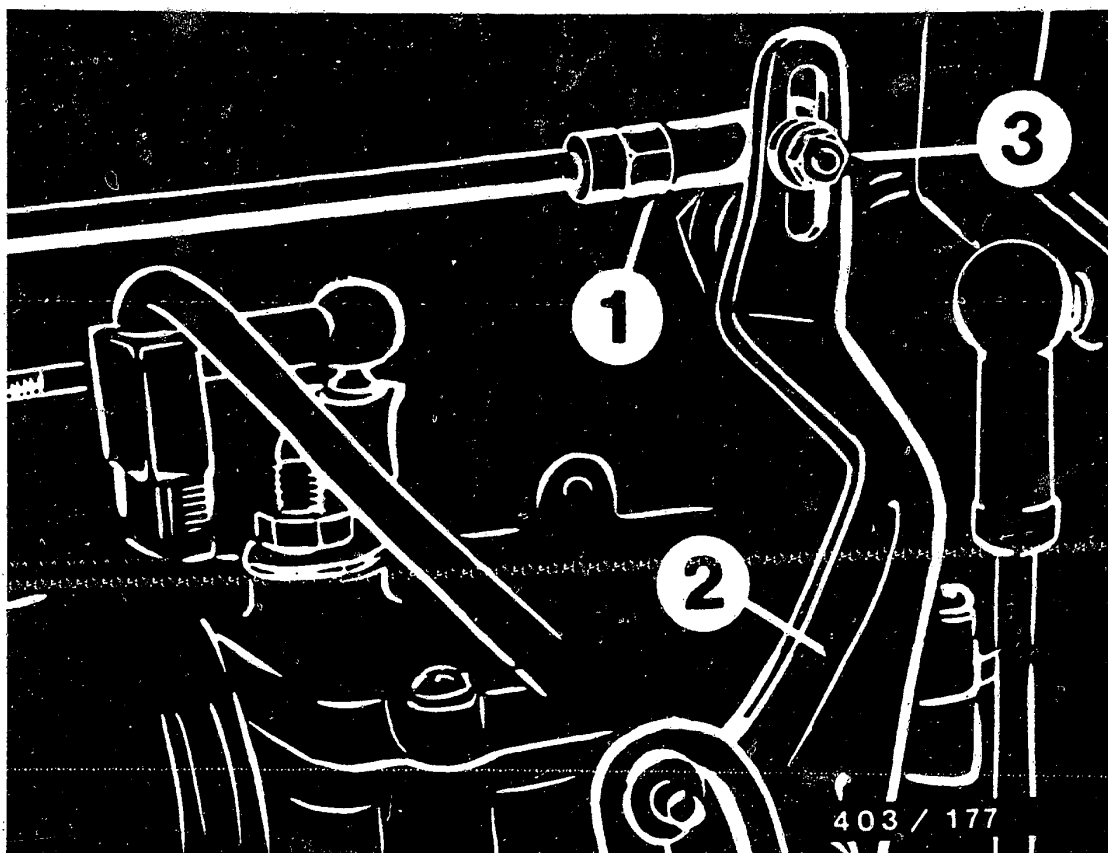




1 = Connecting rod

If roller in variable-fulcrum lever is not without tension at end stop, adjust connecting rod.

Setting of connecting rod from center of ball end to center of ball end = 154 mm.

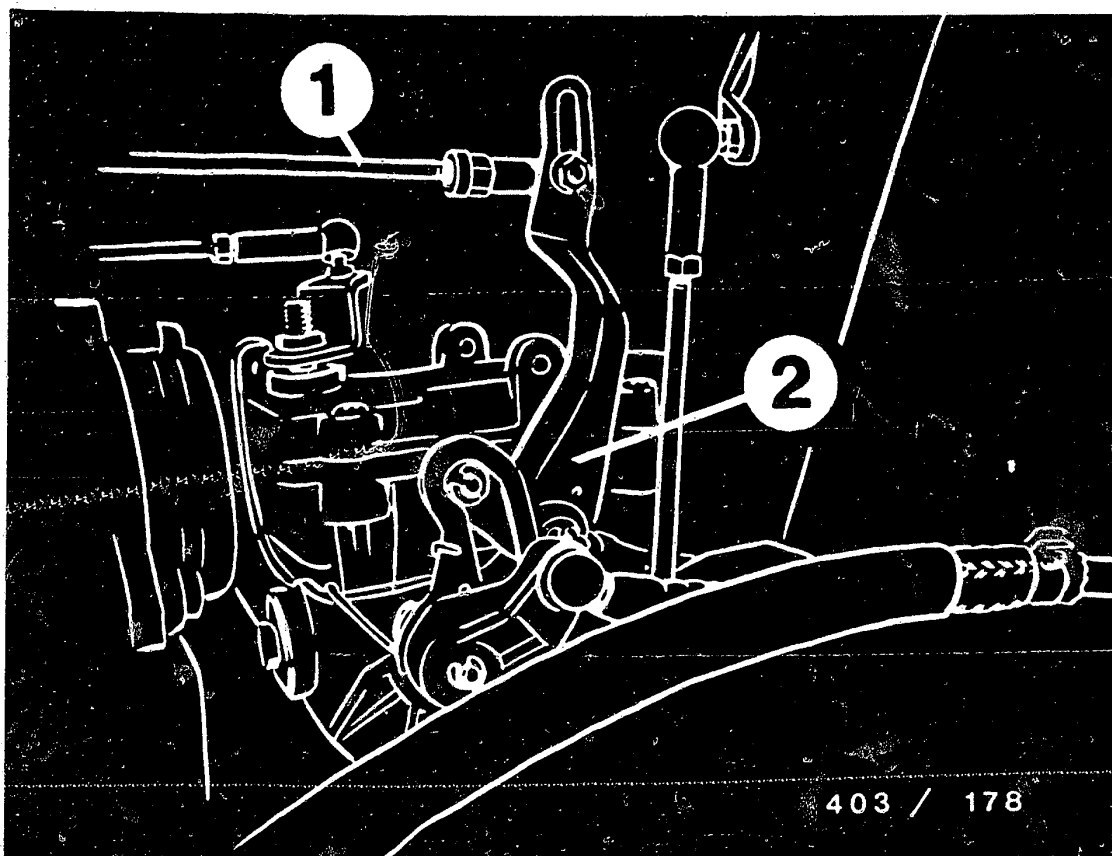


- 1 = Connecting rod
- 2 = Reverse-transfer lever
- 3 = Ball end (adjustable)

Pull variable-fulcrum lever to full load.
Control lever of injection pump must be in contact
with the full-load stop.

If control lever is not in contact with the full-load
stop, loosen the adjustable ball end. Slide in the
slotted hole of the reverse-transfer lever and
counterlock again.





- 1 = Connecting rod
2 = Reverse-transfer lever

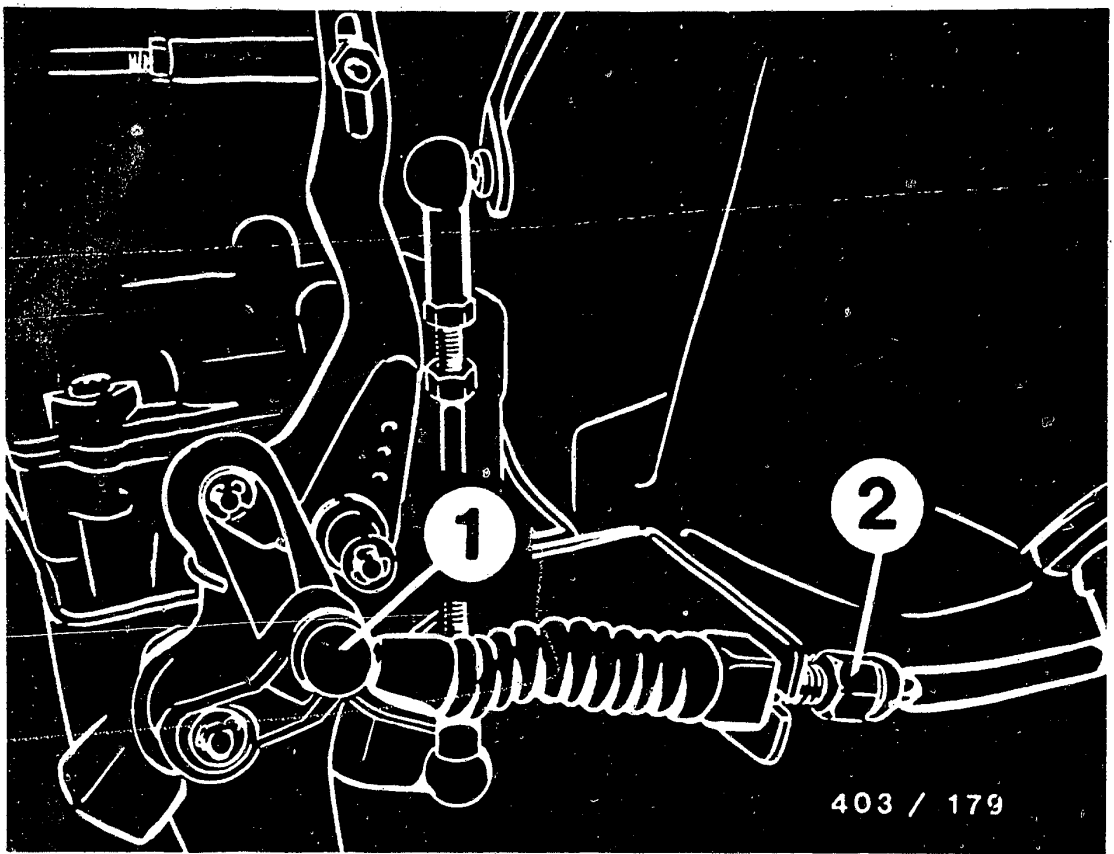
22.2 Adjusting the Tempomat

Unhook connecting rod from final controlling element and push reverse-transfer lever to idle position.

Adjust the length of the connecting rod in such a way that it is 1 mm shorter than the actual maximum clearance.

Hook in connecting rod and counterlock.





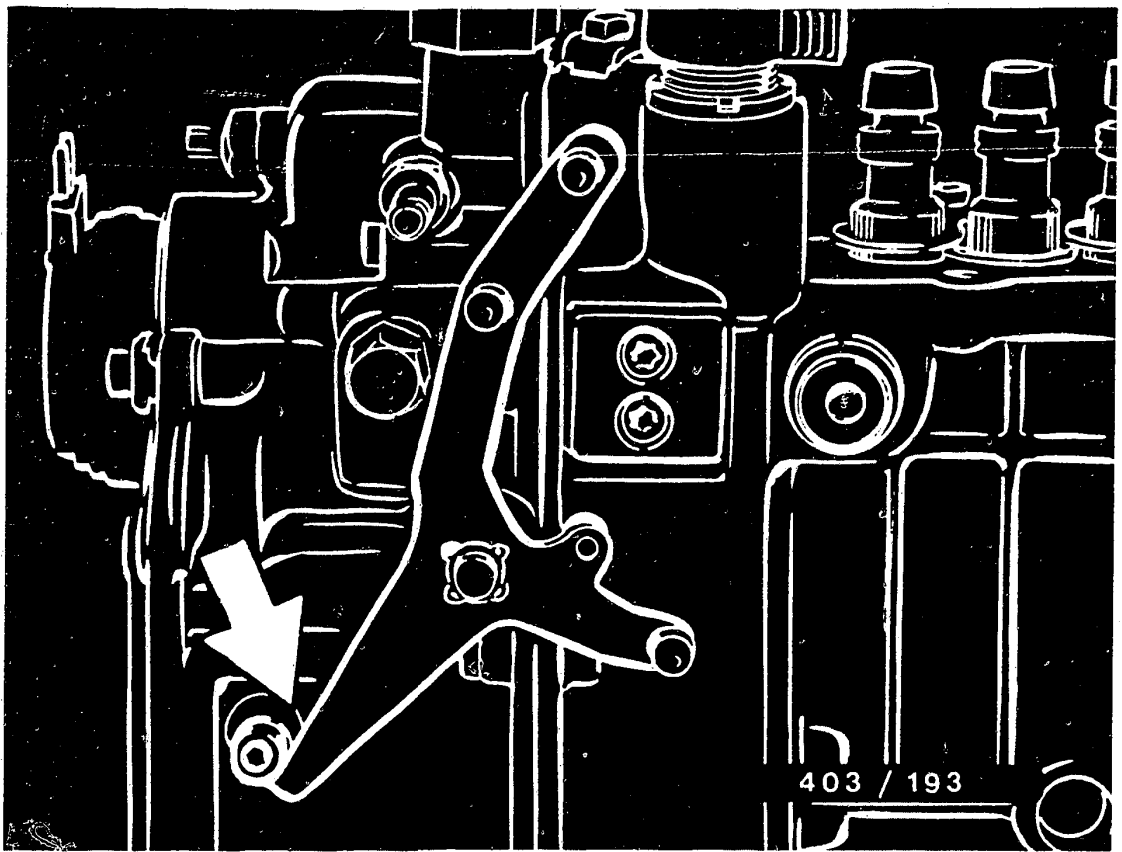
- 1 = Ball socket
2 = Adjusting nut

22.3 Adjusting the control-pressure cable

Release control-pressure cable.
Push control-pressure cable fully forwards.
In this position, install control-pressure cable
without tension.

Adjust by means of adjusting nut.





22.4 Testing and adjusting full-load stop

With the engine switched off, depress accelerator pedal in passenger compartment to full-load stop, or in the case of an automatic transmission to the stop on the kickdown switch.

Control lever of the injection pump must be felt to make contact with the full-load stop (arrow). Adjust by means of connecting rod (not visible in illustration - installation position behind oil filter).



23. TEST VACUUM CONTROL VALVE

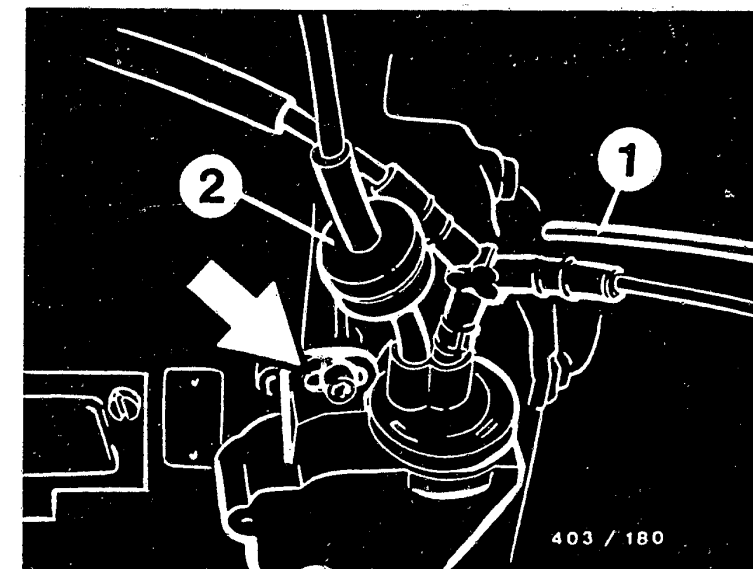
Test conditions

Engine at normal operating temperature, regulating linkage adjusted. Disconnect vacuum line bl/wh from damper and connect vacuum tester to damper connect. Test vacuum at idle speed. Set value: 365 - 405 mbar.

With engine stopped and regulating linkage at full-load stop
set value: 0 mbar

Test vacuum lines for leakages.

no Adjust vacuum control valve. To do this, press injection pump regulating lever to full load. Turn vacuum control valve all the way to the right as far as it will go (slot). In this position, tighten fastening screws.



1 = Vacuum line
2 = Damper

yes

G9

Test vacuum control valve

MB 124/126



G10

Test vacuum control valve

MB 124/126



Test temperature switch 50° C

At coolant temperature exceeding 50° C the temperature switch must interrupt the frame connection to the change-over valve.

Connect ohmmeter to temperature switch.

Set value: $\infty \Omega$

Is set value obtained?

no → Replace temperature switch.

yes

Test change-over valve

Disconnect cable from temperature switch and apply to ground.

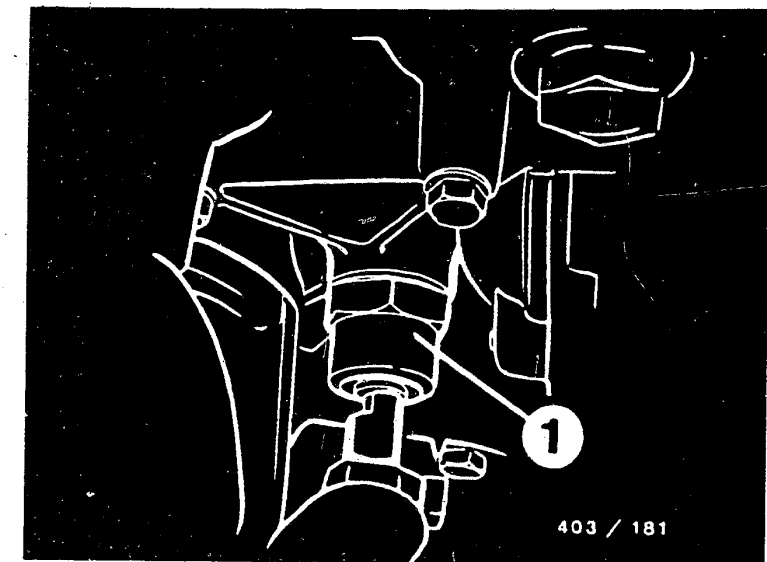
Does change-over valve switch?

no → Test whether voltage is present at the coupling.

If voltage is present, replace change-over valve.

If no voltage is present, test electrical activation.

yes



1 = Temperature switch 50° C

G11

Test vacuum control valve

MB 124/126



G12

Test vacuum control valve

MB 124/126



Test pressure converter

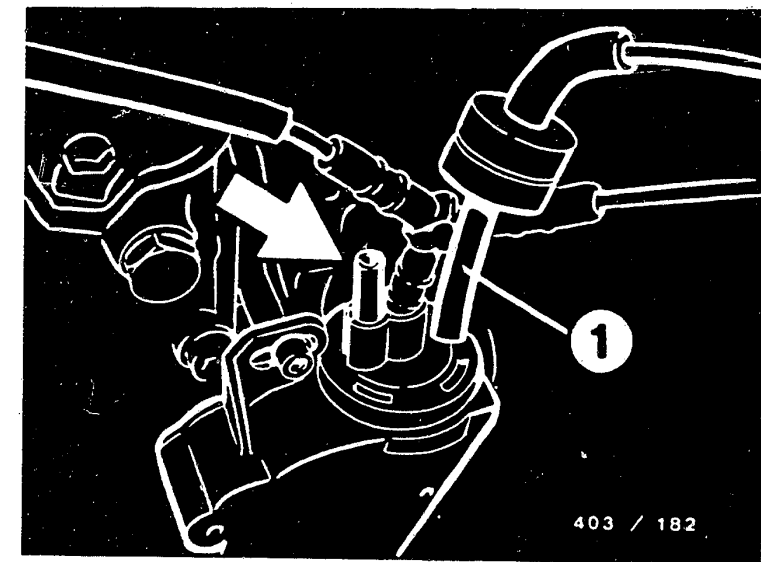
Disconnect vacuum line from vacuum control valve (arrow).

Disconnect fuel-injection tubing (wh) from the ALDA unit. Connect tester to the disconnected tube.

Simulate a charge-air pressure of 740 mbar (if any leaks, replace pressure converter). Connect tester to vacuum-side of connection (TRA) with a Y distributor.

Setting value: 40 ± 20 mbar

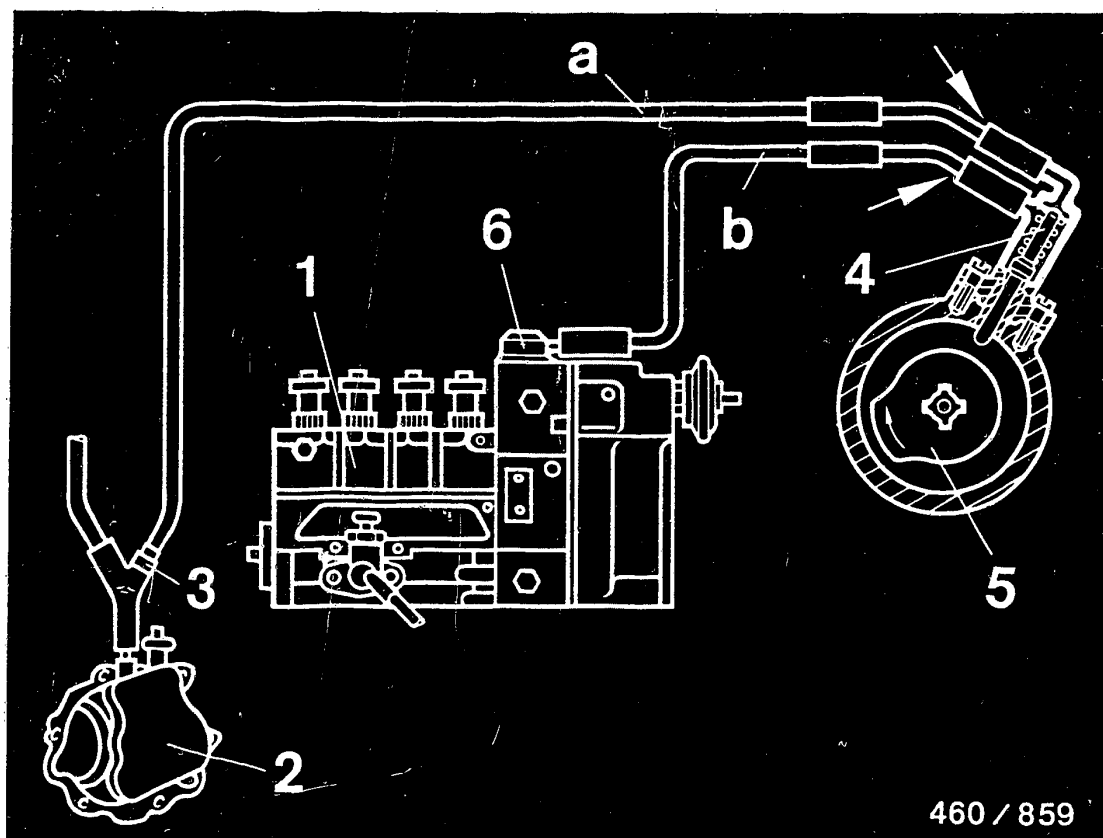
no → Replace pressure converter.



1 = Vacuum line

yes

End of test



460 / 859

- a = Suction line (brown)
- b = Control line (brown/blue)
- 1 = Injection pump
- 2 = Vacuum pump
- 3 = Restriction
- 4 = Valve for key-operated starting system
- 5 = Glow-plug and starter switch disc cam
- 6 = Vacuum unit (shutoff box)

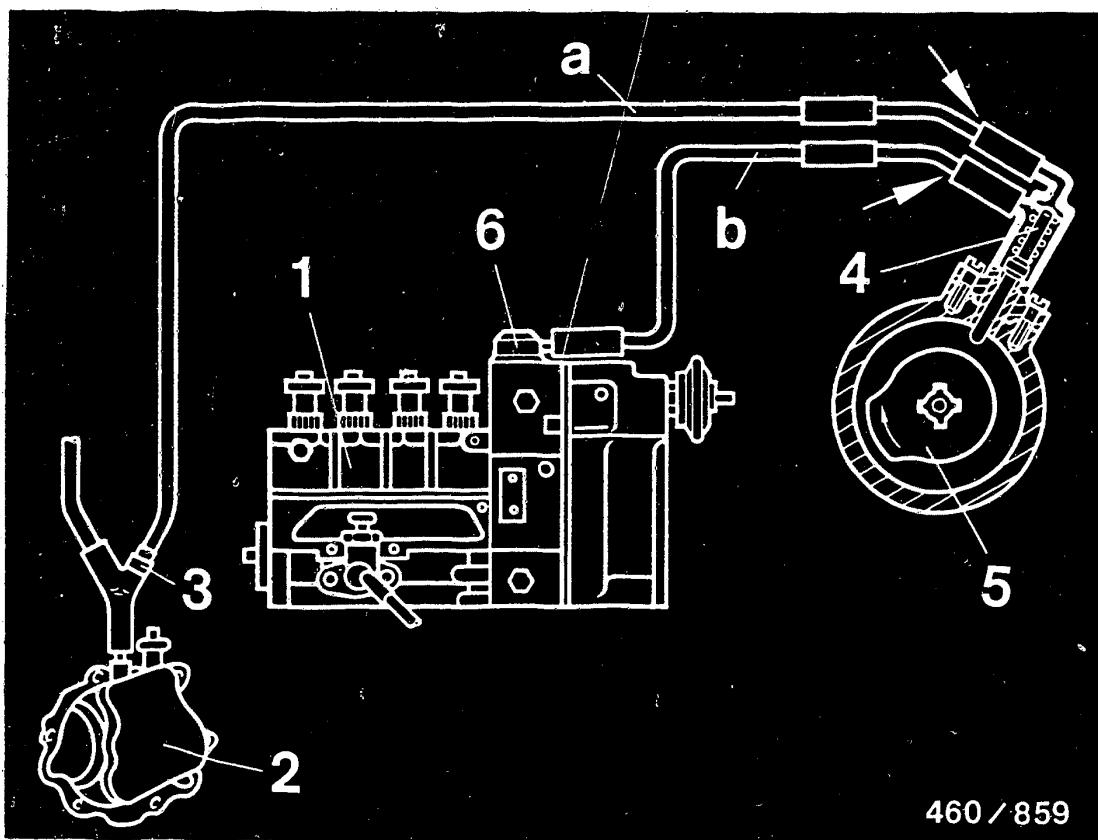
24. TEST VACUUM SHUTOFF FOR LEAKS

G15

Test vacuum shutoff for leaks

MB 124/126





460 / 859

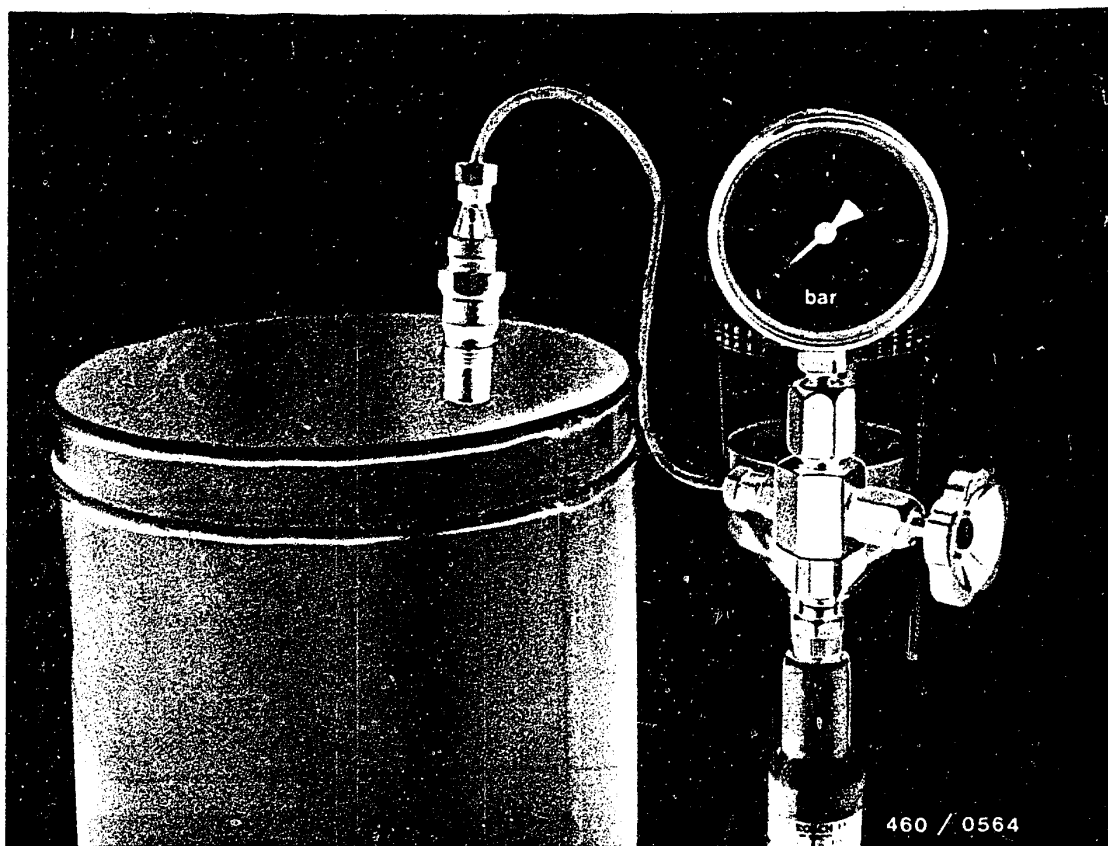
Set glow-plug and starter switch to position "0". Disconnect control line (b, brown/blue) from connecting piece (arrow). Connect vacuum pump to control line and apply 500 mbar vacuum. There must be no loss of vacuum; otherwise vacuum unit (6) or control line leaking.

G17

Test vacuum shutoff for leaks

MB 124/126





25. TEST INJECTION NOZZLES

Remove injection nozzles.

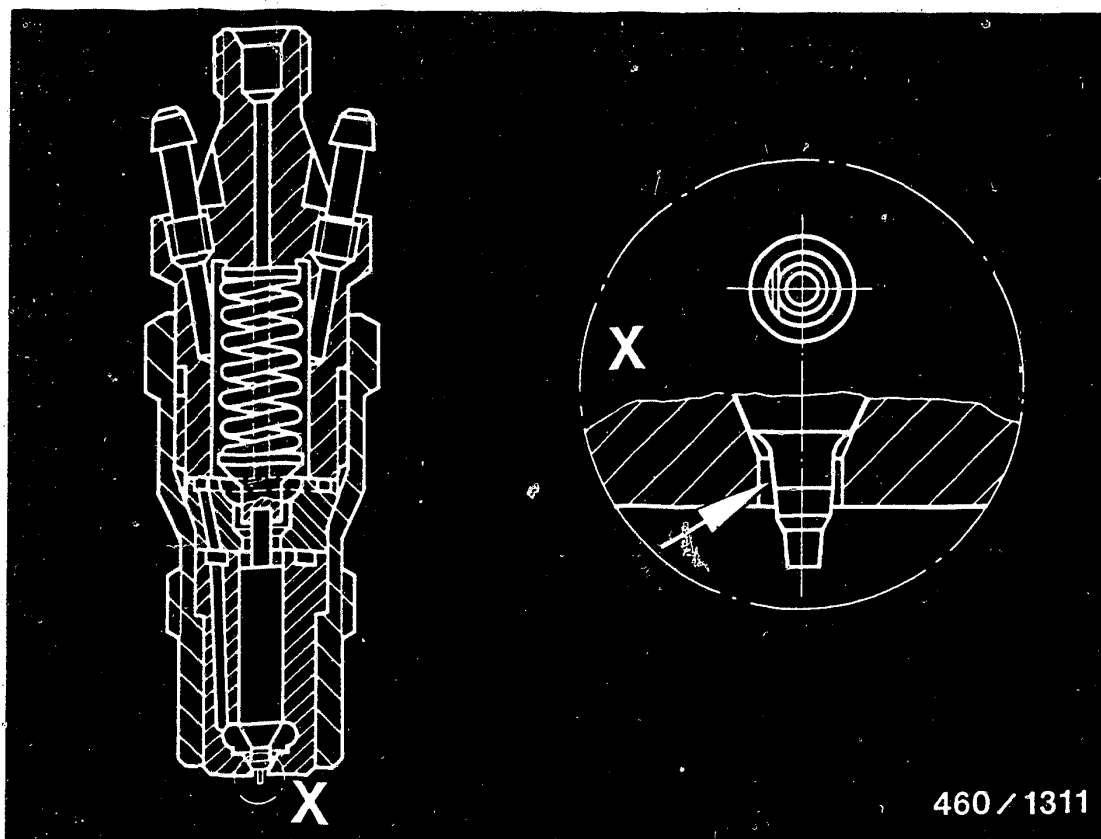
The test is performed using the nozzle tester EFEP 60 H, 0 681 200 502.

Mount injection nozzle with nozzle-holder assembly on nozzle tester.

Caution:

When testing injection nozzles, make sure that the fuel spray does not strike your hands since, due to the high pressure, the fuel will penetrate into the skin and may cause blood poisoning.





460 / 1311

Flat-type pintle nozzles are installed in engine 603 (6-cylinder).

They differ from hole-type pintle nozzles due to a flat on the throttling pintle (see picture, arrow).

25.1 Chatter test (flat pintle nozzle)

The pressure gauge is switched off.

First of all, slowly move hand lever; the nozzle must chatter; likewise, when the lever is moved quickly and jerkily (4...6 downward movements/sec).

As the lever speed is raised there is a range in which the nozzle does not chatter.

In this chatterless range the calibrating oil may escape in the form of a cord.

Note:

The chattering indicates that the nozzle needle is not restricted in its movement and that the nozzle seat as well as its guide are mechanically correct.

The shape of the spray is not important for the chatter test.

25.2 Check injection pressure

Switch on pressure gauge.

Slowly force lever downward. When nozzle begins to squirt, read off injection pressure.

In the case of deviations from the nominal value, the nozzle-opening pressure must be adjusted by shims behind the pressure spring in the nozzle-holder assembly.

Nominal value: new nozzles 115-123 bar

Nominal value for used nozzles: min. 100 bar

Thicker shims = higher nozzle-opening pressure

Thinner shims = lower nozzle-opening pressure

+/- 0.05 mm of shim causes approx. 5.0 bar pressure difference.



Note:

When assembling the injection nozzle, pay attention to the tightening torque of 70 to 90 Nm.

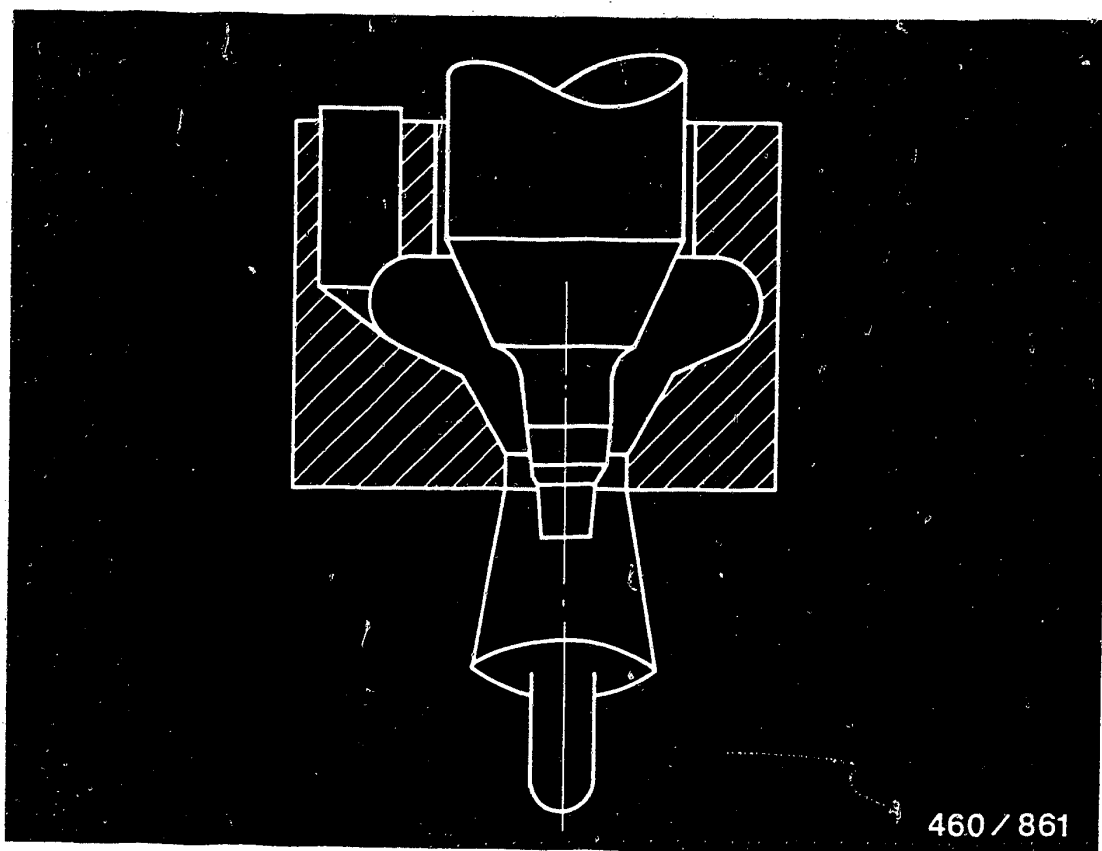
If the tightening torque is exceeded, the nozzle needle may stick.

25.3 Leak test

Switch on pressure gauge.

Slowly force lever downward and maintain pressure approx. 20 bar below opening pressure for 10 seconds. The nozzle must not drip during this period.





460 / 861

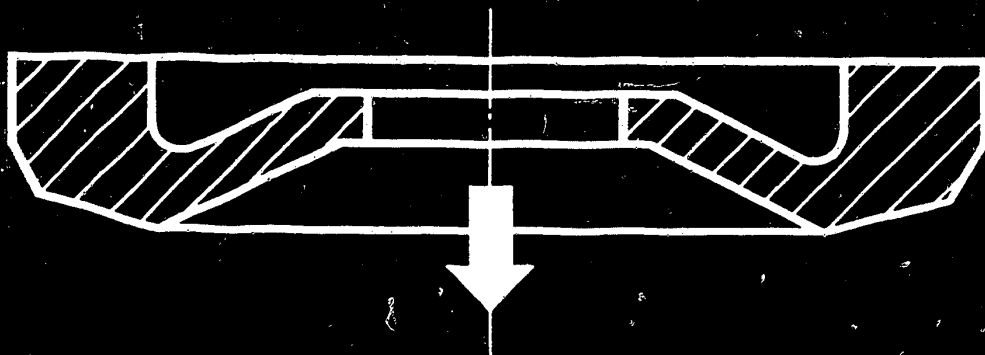
25.4 Spray test

Switch off pressure gauge.

Until the high whistling tone is reached, the spray may be in strands and may be unatomized. A split, discontinuous spray is not important in this range. The spray pattern cannot be assessed until when the lever is being operated quickly (4...6 downward movements per second).

The spray must then be well atomized. The cross section of the spray has an oval shape and is larger than the spray of a throttling pintle nozzle without a flat on the pintle.





460/0609

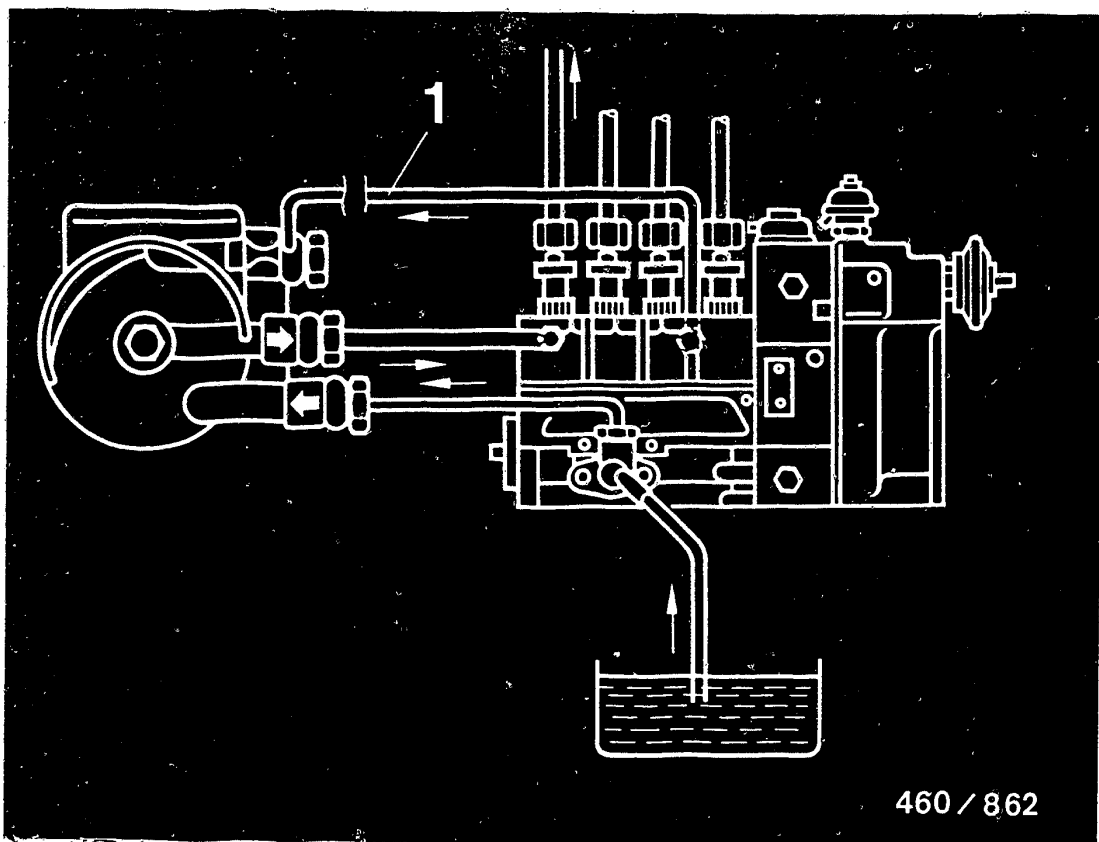
25.5 Install injection nozzles

Before installing the injection nozzles, insert new heat-protection washers the right way round (see picture, arrow) in cylinder head (sealing cone 150° direction of combustion chamber).

Screw in nozzle-holder assembly and tighten to 70 - 80 Nm.

Secure union nuts of fuel-injection tubing to 10 - 20 Nm.





460 / 862

26. TEST FUEL FILTER

Remove return line (1) from fuel filter and hold in measuring beaker.

Lock emergency stop lever in stop position.

Bring glow-plug and starter switch to position "0".

Using jumper cable (one connection to starting motor terminal 50, terminal 30 to battery positive) crank engine for 30 seconds.

If battery intact (10 V during cranking) a fuel delivery of approx. 200 ml/30 s must be reached.



If the value is not reached, check the following points.

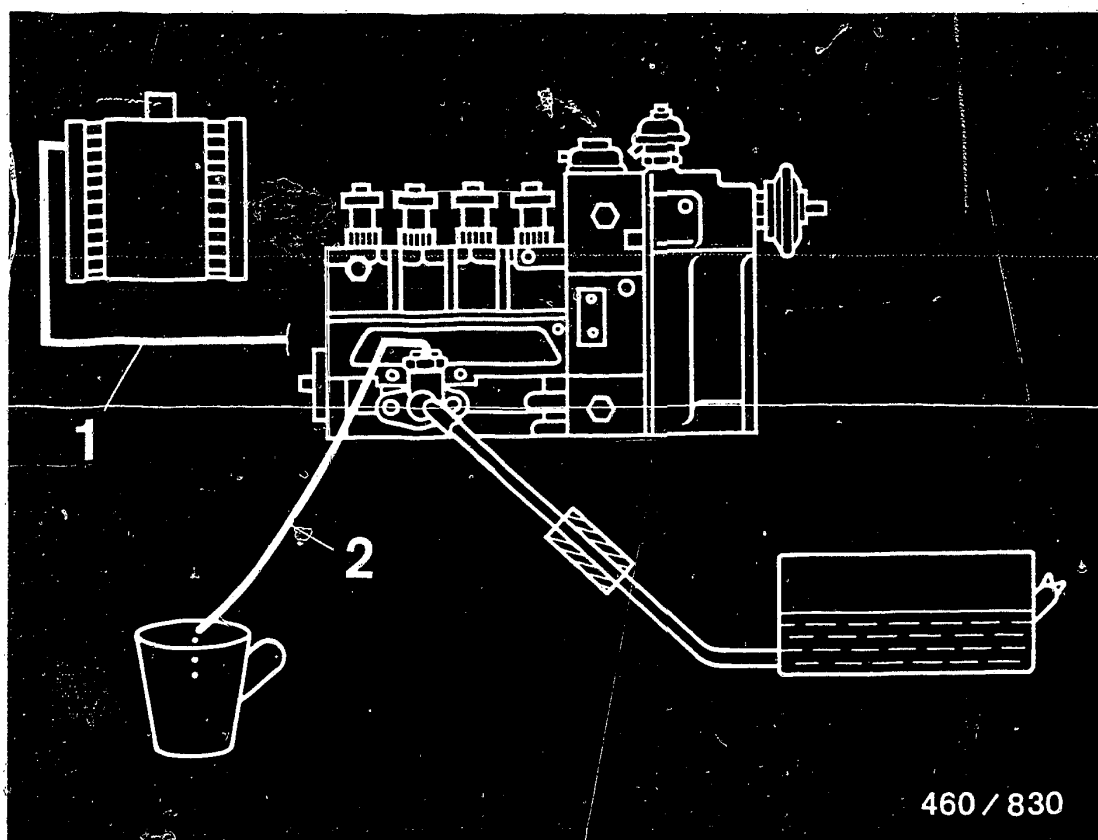
- Overflow valve on injection pump.
- Check fuel filter for fouling. If necessary, mount a new filter element with housing and seal ring.

H1

Test fuel filter

MB 124/126





27. TEST FUEL SUPPLY PUMP

27.1 Testing the fuel delivery

Loosen pressure line (1) on supply pump.

Connect test line (2) to supply pump and hold test line in measuring beaker.

Lock emergency stop lever in stop position.

Bring glow-plug and starter switch to position "0".

Using jumper cable (one connection to starting motor terminal 50, terminal 30 to battery positive) crank engine for 30 seconds.

If battery intact (10 V during cranking) a fuel delivery of approx. 200 ml/30 s must be reached.

28. CHECK PRE-HEATING SYSTEM

Note: the terminal diagram of the pre-heating system shown on the following Coordinates is for 4-cylinder engine 601, but is also valid for engine 602 (5-cylinder) and engine 603 (6-cylinder).

28.1 Necessary test equipment

VA tester	e.g. ETT 011.00	0 684 101 100
Multimeter with digital display		Commercially available

28.2 Workshop information

We recommend that the R-type sheathed-element glow plugs be replaced every 45 000 km.

Note:

If the start of delivery is incorrectly set, this may considerably shorten the service life of the sheathed element glow plug.

For each repeat start, the glow-plug and starter switch must - in order to obtain renewed pre-heating - first of all be turned to position 1 and then to position 2. This makes it possible to re-activate the safety circuit installed in the glow-duration unit.

28.3 Pre-heating time

The on-time of the pre-heating system is dependent on the ambient temperature.

28.4 Requirements

Battery fully charged.

Compression O.K. If necessary, check compression loss.

Fuel supply/fuel-injection system O.K.



28.5 Fault indication

A fault in the preheating system is indicated by the failure of the glow-plug indicator lamp to light up when the glow-plug and starter switch is in position 2.

The following faults are covered:

- Open circuit in lead term. 30 to glow-duration unit
- Fuse 80 A defective
- Power relay in glow-duration unit defective
- Open circuit in one or more leads to sheathed-element glow plugs
- One or more sheathed-element glow plugs defective

H4

Check pre-heating system

MB 124/126



Starting motor operates, engine fails to start or starts only with great difficulty

yes

Test power supply to R-type sheathed-element glow plugs

Connect voltmeter to R-type sheathed-element glow plug and to ground.
Set glow-plug and starter switch to position 1 and then to position 2.
For at least 7 seconds (temperature-dependent) a minimum voltage of 10 V must be indicated. After this time the system switches off automatically.

Caution:

If the measurement has to be repeated, first of all set glow-plug and starter switch to position 1 and then to position 2.

Minimum voltage present?

yes

Test current consumption of R-type sheathed-element glow plugs.

Place current pickup over the individual leads to glow-duration unit one after the other.
Set glow-plug and starter switch to position 1 and then to position 2. After 10...20 seconds the current consumption of each sheathed-element glow-plug must be 8...15 A.

Current consumption reached?

yes

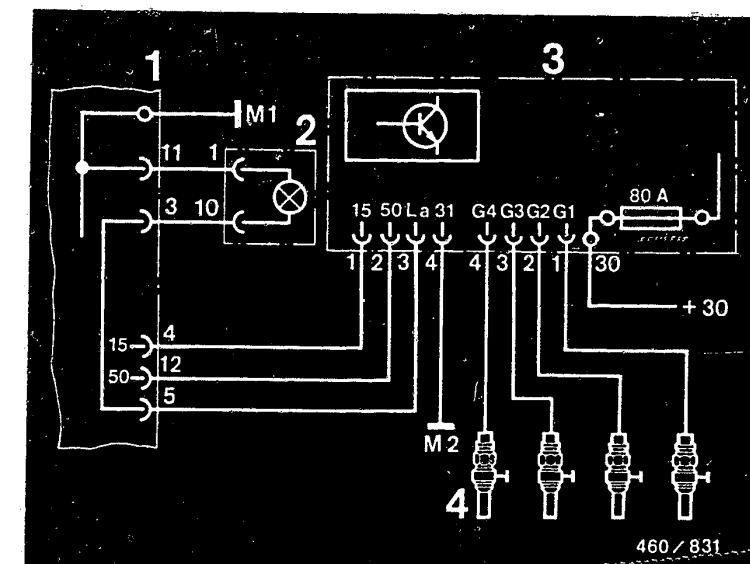
Continued on H7/H8

no

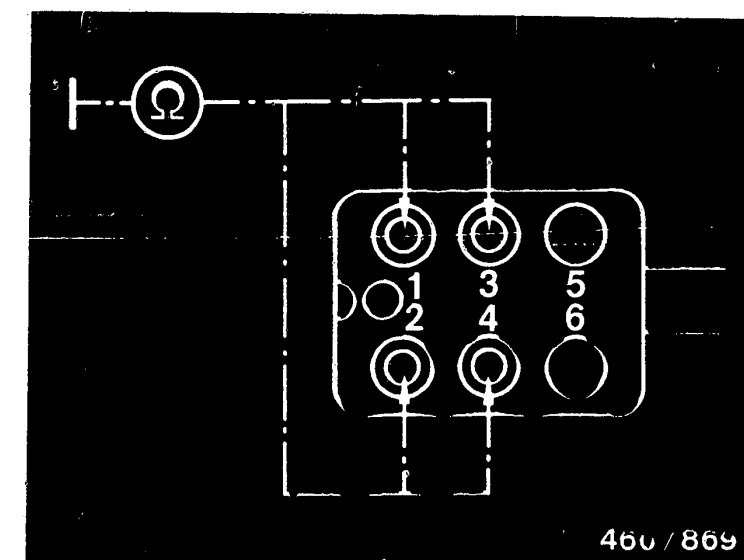
1. Voltage below 10 V, then test for voltage drop in power circuit (battery +) as well as term. 30 on glow-duration unit including 80 A fuse.
Eliminate voltage drop.
2. If no voltage, test for open circuit in leads between R-type sheathed-element glow plugs and glow-duration unit term. G1 - G4. Eliminate open circuit.
If no open circuit, continue on Coordinate H13/H14.
Not necessary to continue here.

no

If current consumption above 15 A, renew R-type sheathed-element glow plug. Below 8A, test for open circuit in electric lead or R-type sheathed-element glow-plug. To do this, disconnect 6-fold connector on glow-duration unit. Using ohmmeter, measure sockets 1...4 (corresponding to R-type sheathed-element glow plugs of cyl. 1...4) to ground (engine block) (see bottom picture).
Ohmmeter must indicate 0 Ω . If reading $\infty \Omega$ open circuit in lead or R-type sheathed-element glow plug.
Eliminate open circuit or replace R-type sheathed-element glow plug.



- 1 = Central-electrics console
- 2 = Glow-plug indicator lamp (in instrument cluster)
- 3 = Glow-duration unit
- 4 = R-type sheathed-element glow plug
- M 1 = Main ground (behind instrument cluster)
- M 2 = Ground at front left (near lamp unit)



H5

Check pre-heating system

MB 124/126



H6

Check pre-heating system

MB 124/126



Check pre-heating system (continued)

yes

Note:

It is possible that the glow-plug indicator lamp (as a result of unfavourable tolerances) will indicate a fault only when 2 R-type sheathed-element glow plugs in cyl. 2...4 have failed.

To ensure that the fault indication in the glow-duration unit is not defective, disconnect 2 sheathed-element glow plugs of cyl. 2...4 and repeat preheating process. If indicator lamp now indicates a fault (not lit) glow duration unit is O.K.

Test glow-plug indicator lamp

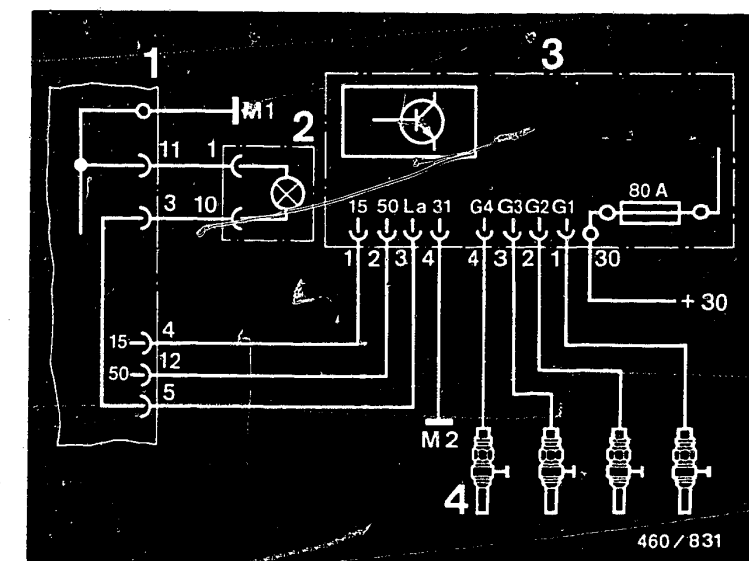
Set glow-plug and starter switch to position 1 and then to position 2. Glow-plug indicator lamp must light up.
Glow-plug indicator lamp lit?

no

1. Test for open circuit in lead between central-electrics console term. 4 and glow-duration unit term. 15. Eliminate open circuit.
2. Test for open circuit in lead between glow-duration unit term. La and glow-plug indicator term. 10 including ground lead term. 1 to main ground (behind instrument cluster). Eliminate open circuit.

yes

Continued on H9/H10



- 1 = Central-electrics console
- 2 = Glow-plug indicator lamp (in instrument cluster)
- 3 = Glow-duration unit
- 4 = R-type sheathed-element glow plug
- M 1 = Main ground (behind instrument cluster)
- M 2 = Ground at front left (near lamp unit)

H7

Check pre-heating system

MB 124/126



H8

Check pre-heating system

MB 124/126



Check pre-heating system (continued)

yes

Test preheating time

Set glow-plug and starter switch to position 1 and then to position 2.
The preheating time (glow-plug indicator lamp lit) depends on the engine compartment temperature. See graph.

Preheating time (seconds) O.K.?

no

Renew glow-duration unit.

yes

Test safety switch-off circuit

Connect voltmeter to R-type sheathed-element glow plug and to ground. Set glow-plug and starter switch to position 1 and then to position 2.

The time for the safety switch-off is no longer rigidly specified. It results from the time up to readiness for starting (going out of glow-plug indicator lamp) plus 20 - 35 seconds. During this time the voltmeter must indicate voltage (see graph).

After this time the voltmeter must indicate 0 V.

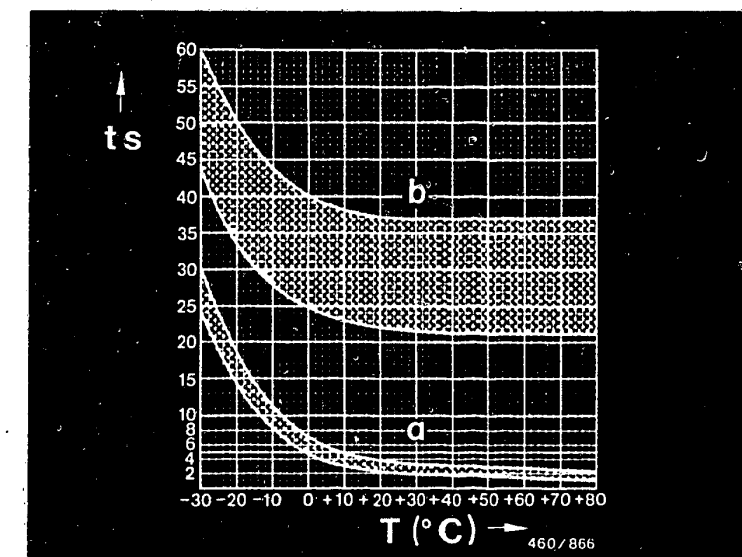
Voltmeter at 0 V after specified time?

no

Renew glow-duration unit.

yes

Continued on H11/H12



t_s = Time in seconds

T °C = Engine-comp.temp.

a = Preheating time

b = Safety switch-off

H9

Check pre-heating system

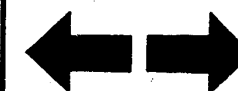
MB 124/126



H10

Check pre-heating system

MB 124/126



Check pre-heating system (continued)

yes

Test preheating when operating starting motor

Connect voltmeter to R-type sheathed-element glow plug and to ground.
Set glow-plug and starter switch to position 2.
Voltmeter must indicate approx. 10 V.

Voltage present?

no

1. Test for open circuit in lead between glow-plug and starter switch term. 50 and glow-duration unit term. 50.
Eliminate open circuit.
2. If point 1 O.K., renew glow-duration unit.

yes

Test R-type sheathed-element glow plugs

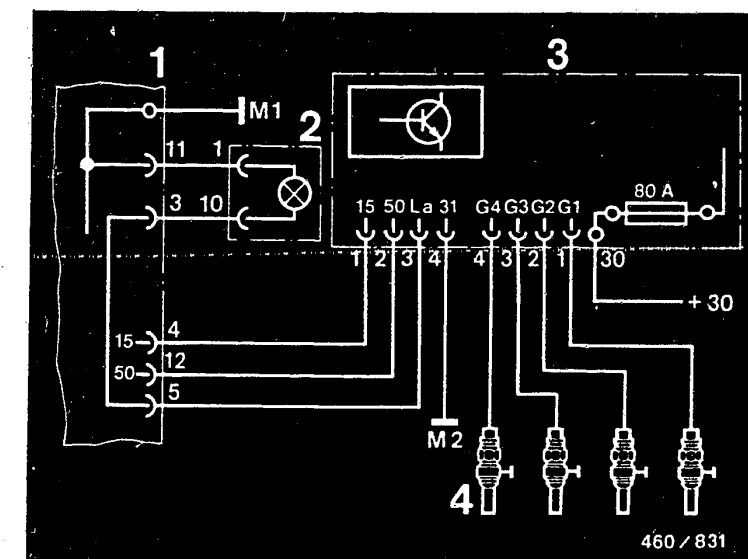
Using ohmmeter, test R-type sheathed-element glow plugs individually for continuity.
O.K.?

no

Renew R-type sheathed-element glow plugs.

yes

Preheating system O.K.
Tests as of H13 not necessary.



1 = Central-electrics console

2 = Glow-plug indicator lamp
(in instrument cluster)

3 = Glow-duration unit

4 = R-type sheathed-element glow plug
M 1 = Main ground (behind instrument
cluster)

M 2 = Ground at front left (near lamp
unit)

H11

Check pre-heating system

MB 124/126



H12

Check pre-heating system

MB 124/126



Check pre-heating system (continued from H5/H6)

Test voltage at glow-duration unit term. 15

Disconnect 4-pin plug from glow-duration unit. Connect voltmeter to plug socket 1 and plug socket 4. Set glow-plug and starter switch to position 1 and then to position 2. The voltmeter must indicate battery voltage. Battery voltage present?

no

Test for open circuit in lead between glow-duration unit term. 15 and glow-plug and starter switch. Eliminate open circuit.

yes

Test ground lead term. 31 from glow-duration unit.

Connect voltmeter to glow-duration unit plug term. 31 and battery +. Voltmeter must indicate battery voltage. Battery voltage present?

no

Test for open circuit in ground lead term. 31 from glow-duration unit. Eliminate open circuit.

yes

Test voltage at glow-duration unit term. 30 and 80 A fuse

Connect voltmeter to glow-duration unit, once before and once after 80 A fuse, and to ground. In either case voltmeter must indicate battery voltage. Battery voltage present?

no

1. Test 80 A fuse - renew if necessary.
2. Test for open circuit in lead between glow-duration unit term. 30 and battery + through engine cable connector term. 30. Eliminate open circuit.

yes

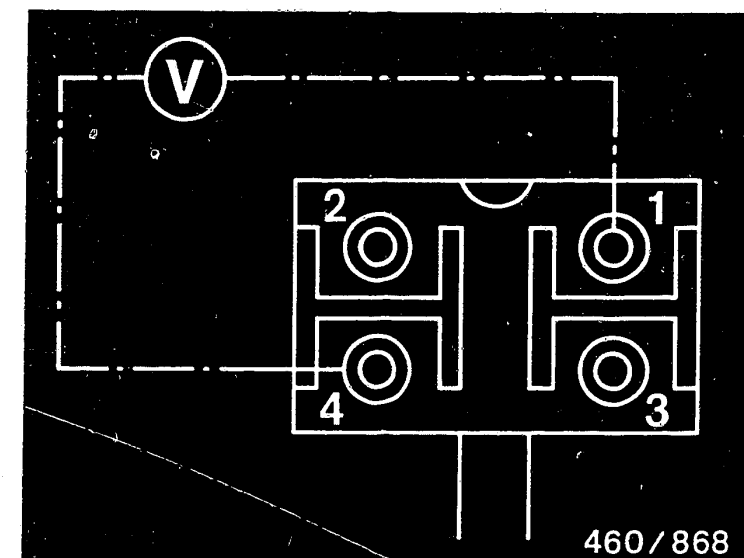
Voltage now present at R-type sheathed-element glow-plug.

no

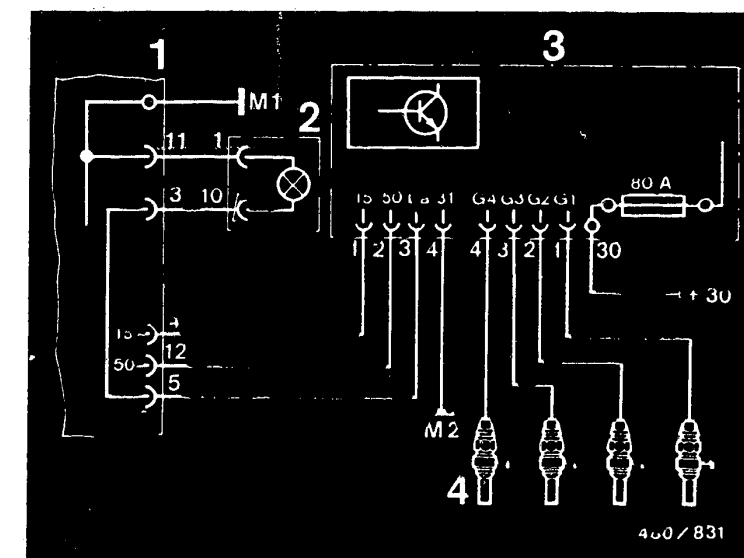
Renew glow-duration unit.

yes

Continued on H15/H16



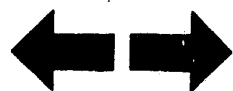
- 1 = Central-electrics console
- 2 = Glow-plug indicator lamp (in instrument cluster)
- 3 = Glow-duration unit
- 4 = R-type sheathed-element glow plug
- M 1 = Main ground (behind instrument cluster)
- M 2 = Ground at front left (near lamp unit)



H13

Check pre-heating system

MB 124/126

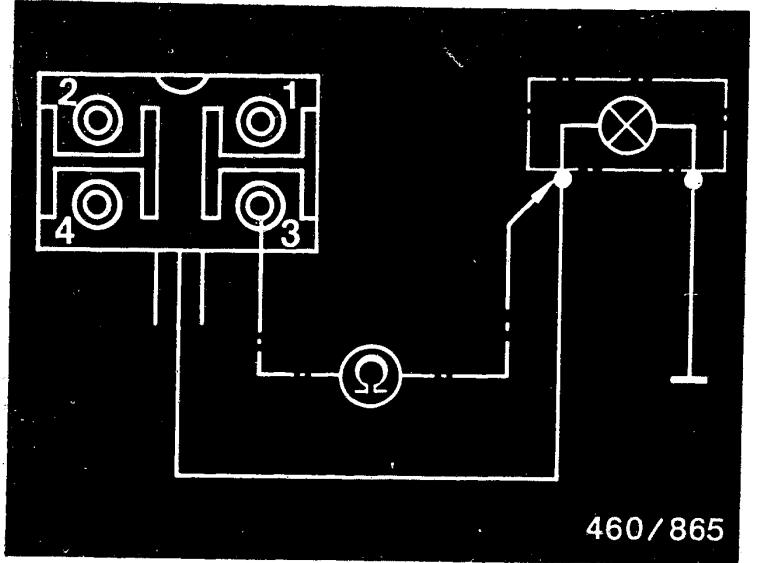
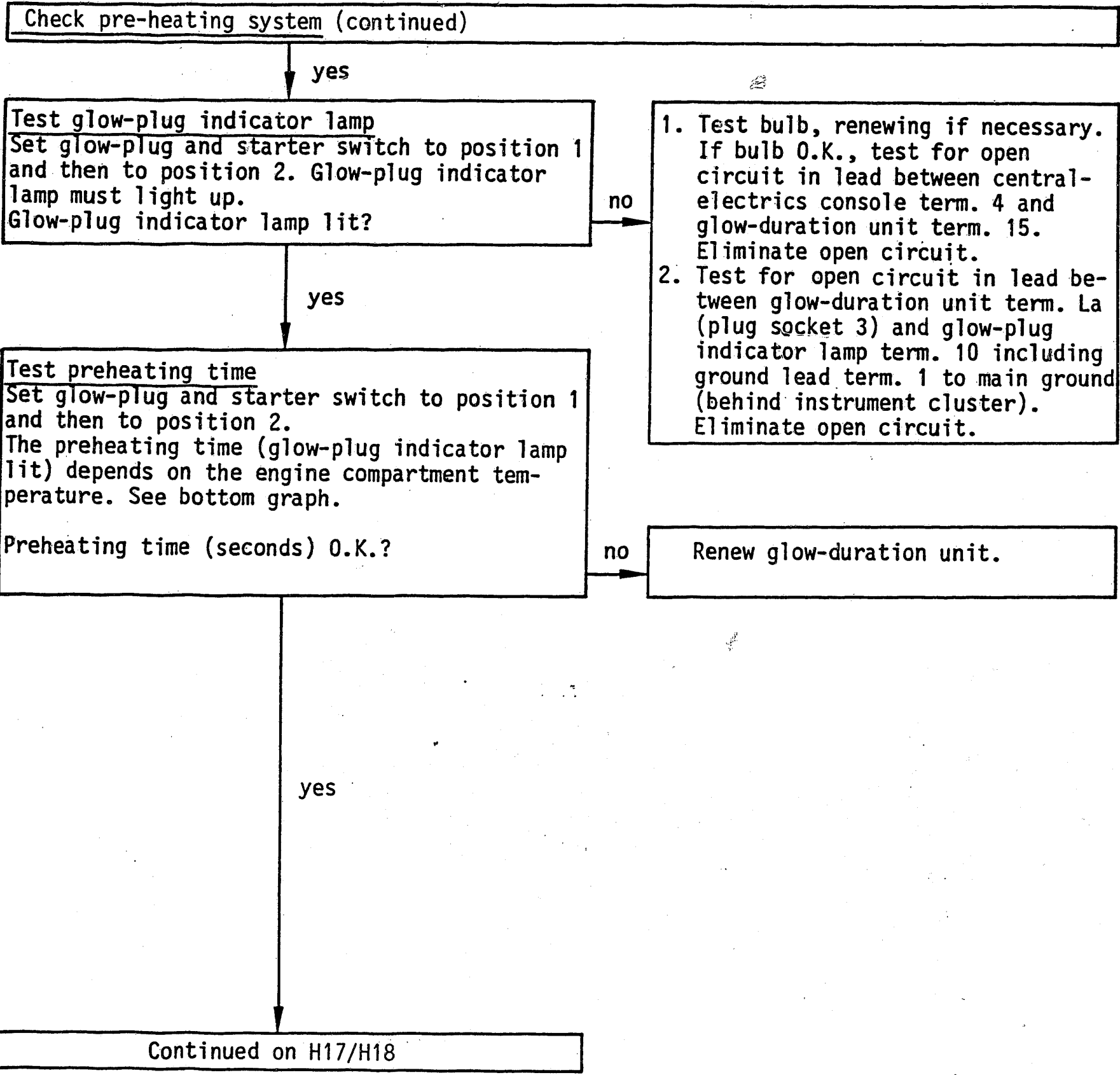


H14

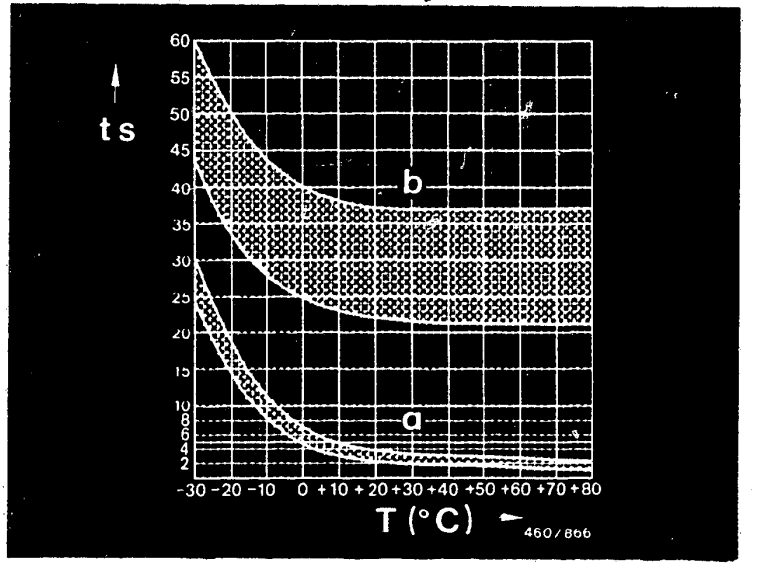
Check pre-heating system

MB 124/126





t_s = Time in seconds
 T °C = Engine comp. temp.
 a = Preheating time
 b = Safety switch-off



Check pre-heating system (continued)

yes

Test safety switch-off circuit

Connect voltmeter to R-type sheathed-element glow plug and to ground. Set glow-plug and starter switch to position 1 and then to position 2.

The time for the safety switch-off is no longer rigidly specified. It results from the time up to readiness for starting (going out of glow-plug indicator lamp) plus 20 - 35 seconds. During this time the voltmeter must indicate voltage (see graph).

After this time the voltmeter must indicate 0 V.

Voltmeter at 0 V after specified time?

no

Renew glow-duration unit.

yes

Test preheating when operating starting motor

Connect voltmeter to R-type sheathed-element glow plug and to ground.

Set glow-plug and starter switch to position 2. Voltmeter must indicate approx. 10 V.

Voltage present?

no

1. Test for open circuit in lead between glow-plug and starter switch term. 50 and glow-duration unit term. 50. Eliminate open circuit.
2. If point 1 O.K., renew glow-duration unit.

yes

Test R-type sheathed-element glow plugs

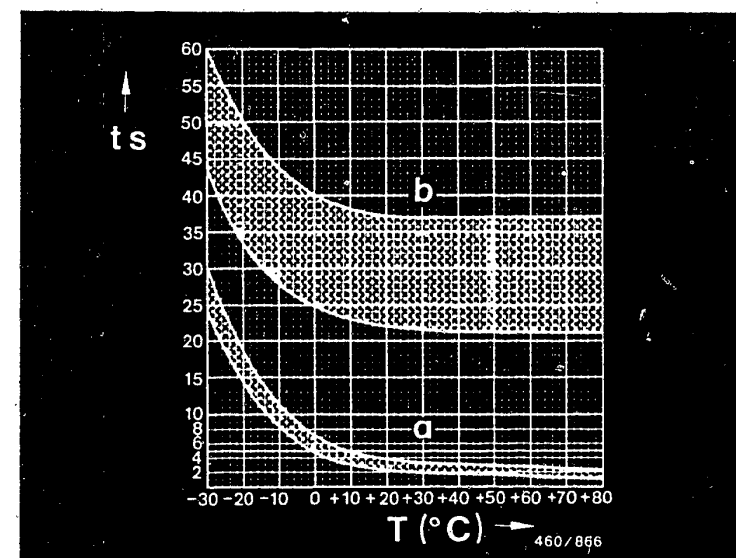
Using ohmmeter, test R-type sheathed-element glow plugs individually for continuity. O.K.?

no

Renew R-type sheathed-element glow plug.

yes

Pre-heating system O.K.?



t_s = Time in seconds

T °C = Engine comp. temp.

a = Preheating time

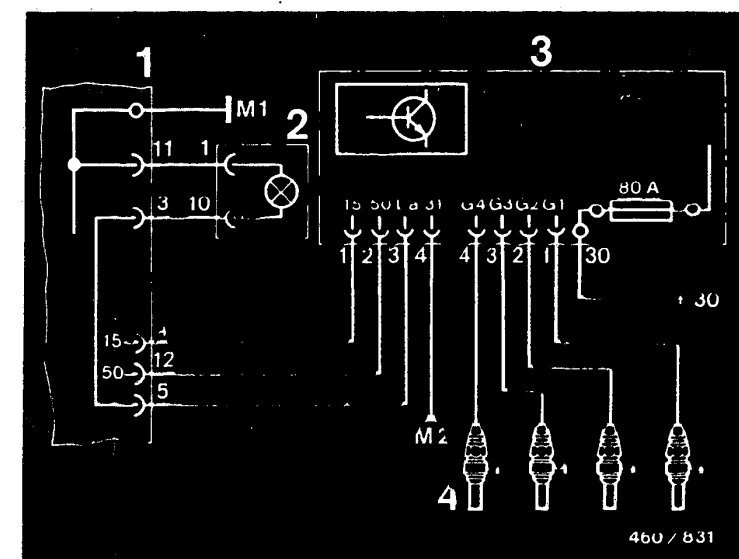
b = Safety switch-off

1 = Central-electrics console

2 = Glow-plug indicator lamp

3 = Glow-duration unit

4 = R-type sheathed-element glow plug



H17

Check pre-heating system

MB 124/126

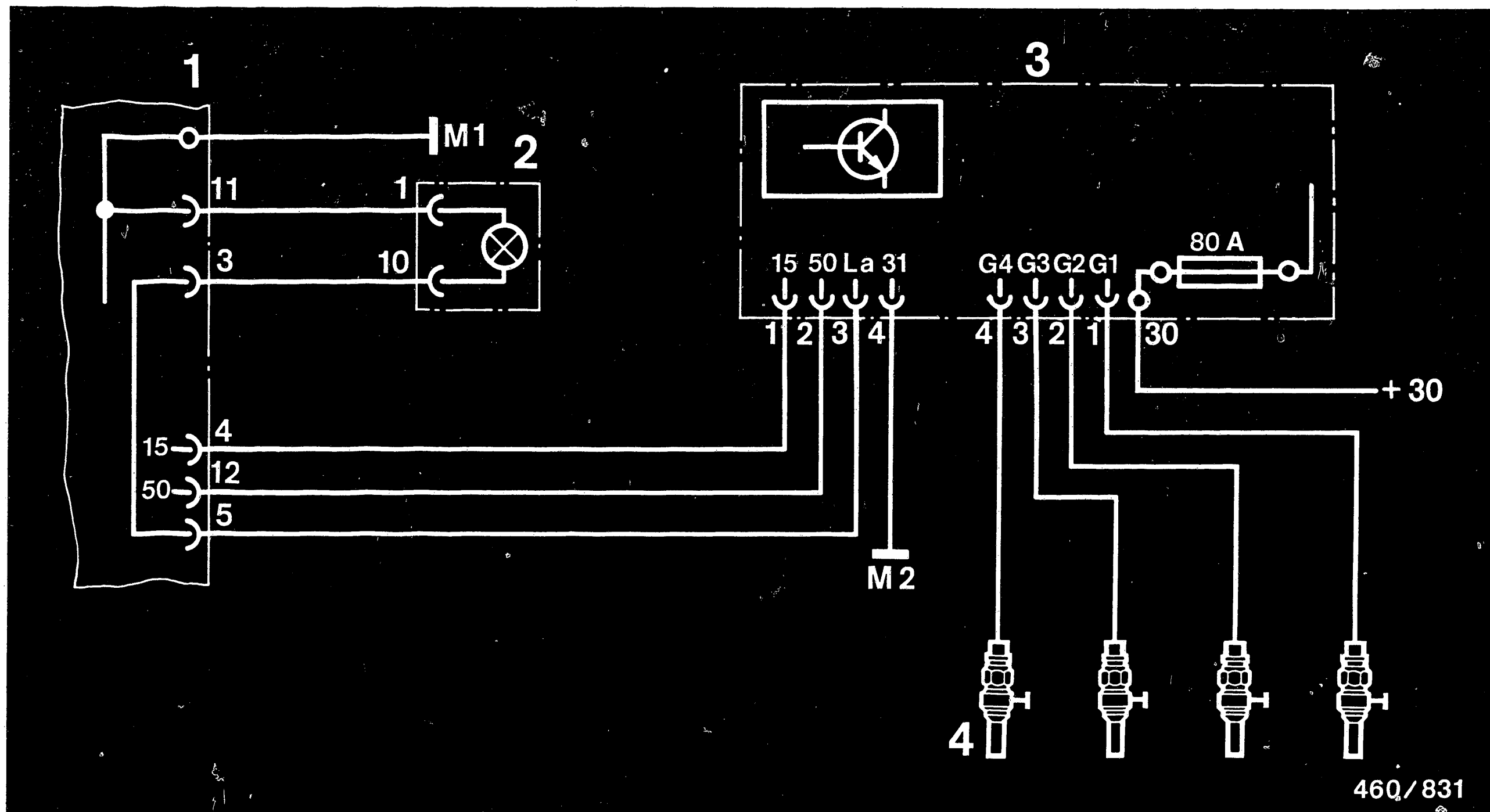


H18

Check pre-heating system

MB 124/126





1 = Central-electrics console
 2 = Glow-plug indicator lamp in instrument cluster
 3 = Glow-duration unit
 4 = Sheathed-element glow plugs

M 1 = Main ground behind instrument cluster
 M 2 = Ground at front left (near lamp unit)

28.4 Terminal diagram for preheating system

Valid for 4, 5 and 6 cylinder engines (4 cylinder engine shown in picture)

H 19

Check pre-heating system

MB 124/126



H 20

Check pre-heating system

MB 124/126



29. CHECK OPERATION OF TIMING DEVICE

The operation of the timing device is checked by means of governor pulse and TDC pickup.

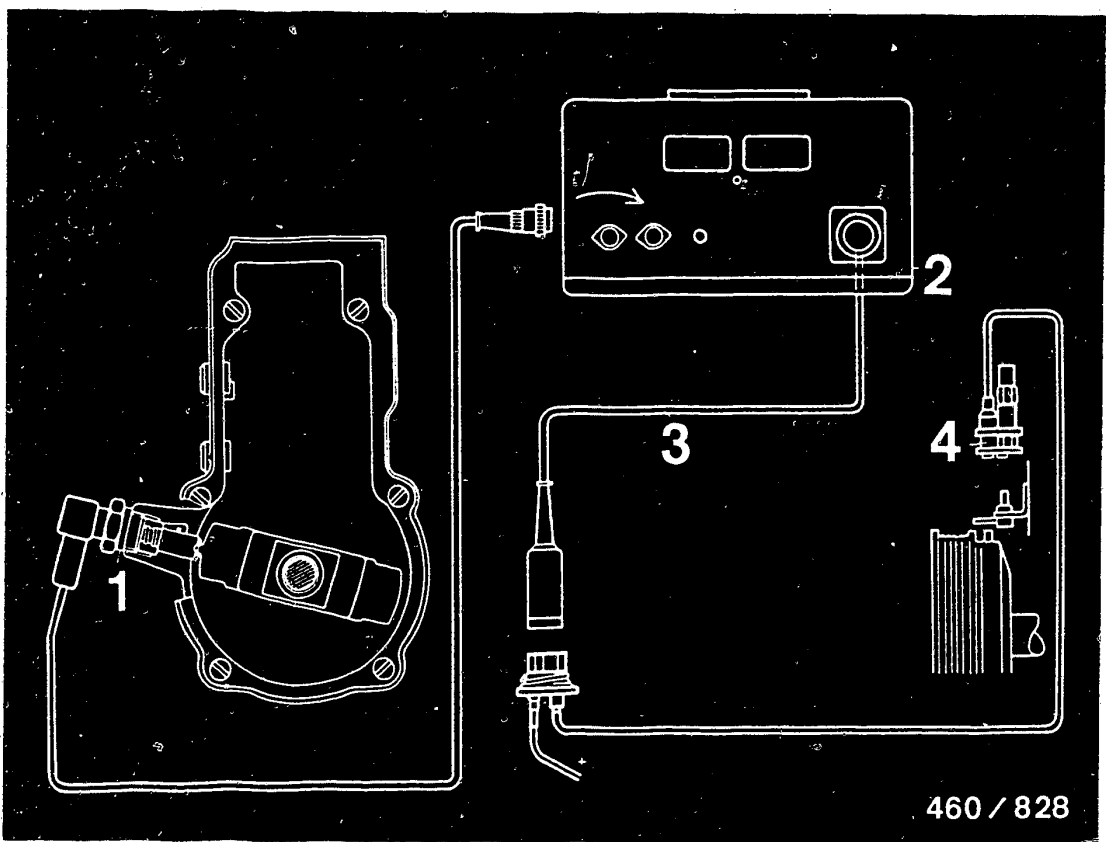
As the engine speed rises the governor pulse is advanced by the timing device.

The start of delivery reading becomes smaller and, at maximum advance, reaches approx. 1° after TDC.

Note: The advance in degrees must take place briskly and smoothly.

If no advance is detectable, the timing device is defective.





- 1 = Governor pulse generator, Daimler Benz part no. 617 589 102 100
 2 = Diesel engine tester ETD 019.00, Bosch part no. 0 684 101 900
 3 = Adapter lead, Bosch part no. 1 684 463 147

29.1 Connection diagram for testing operation of timing device with diesel engine tester ETD 019.00

30. MEASURE ENGINE COMPRESSION AND COMPRESSION LOSS

30.1 Measure engine compression

Fit new chart in compression tracer. Mount high-pressure hose on tracer. Remove nozzle-holder assembly.

Turn engine over several times using starting motor so that loose carbon residues are removed from the compression space.

Screw connecting nipple of pressure tracer into opening of nozzle-holder assemblies.

Mount high-pressure hose of pressure tracer on connecting nipple.



During the following operation, note first compression stroke in particular.

Operate starting motor until there is no longer any detectable rise in pressure on the compression tracer.

Bleed compression tracer by pressing on bleeder valve.

The pointer returns to the starting position.

Move chart onto next position.

Fit connecting nipple to the other cylinders and repeat measurement.

Compression pressure	Allowable difference between cylinders
24 - 30 bar	max. 20%
Wear limit approx. 18 bar	



30.1.1 Evaluation of chart

1. Normal pressure rise

If piston rings and valves are in good condition, the first compression stroke shows the highest pressure increase. During the following compression strokes the compression builds up to the maximum pressure.

2. Gradual pressure rise

If, from the start, the compression increases only gradually on each piston stroke, this points to burnt valve seats or defective valve guides.

3. Low maximum pressure

If the maximum compression obtained is too low on all cylinders, this points to defective pistons, piston rings or valves.

If the compression is too low on two neighbouring cylinders, this points to a leaky cylinder head gasket.



4. Varying compression

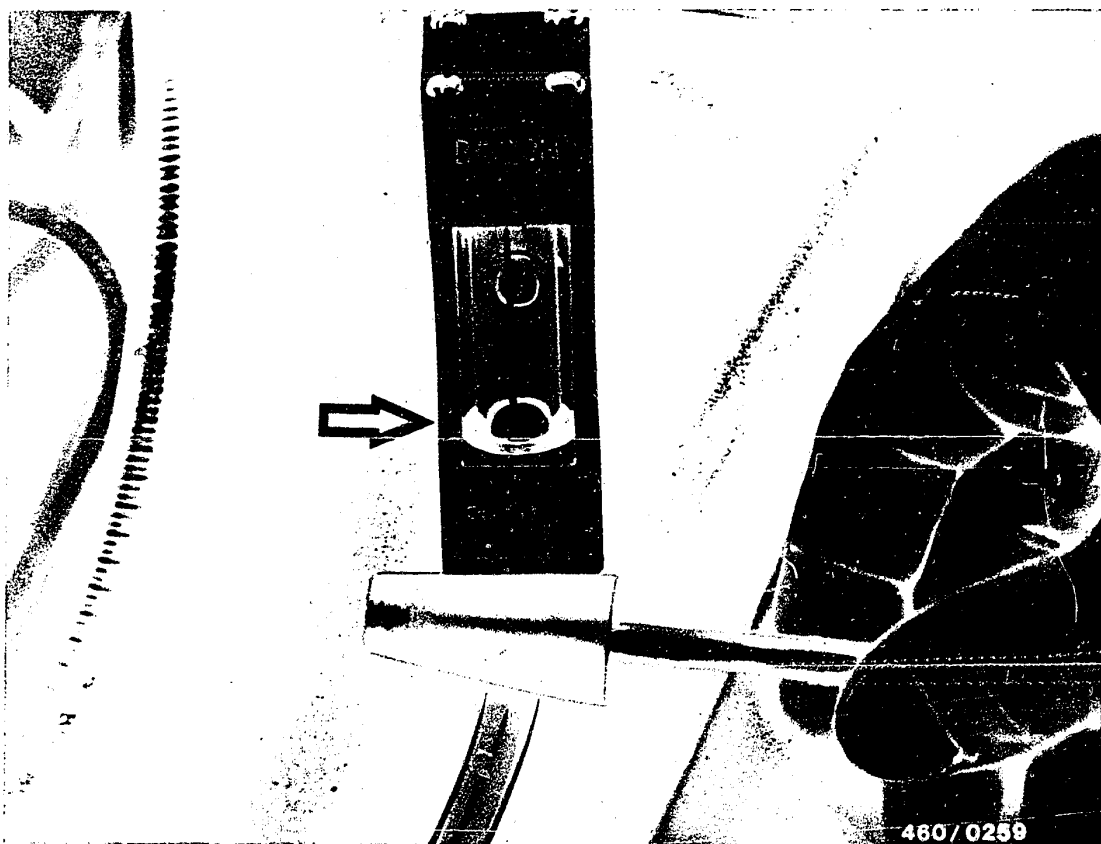
If one cylinder shows a clearly lower compression, proceed as follows: Fill in 2 - 3 cm³ of engine oil through the opening of the sheathed-element glow plug or nozzle holder and operate starting motor briefly.

Repeat measurements and compare charts. If there is a clear increase in compression during the second test, then the piston rings or cylinders are worn. If there is no change in the result, then defective valves are the cause.

5. Uniform compression

Uniform compression is extremely important with regard to the smooth running of the engine. Maximum compression is, therefore, not the only objective.





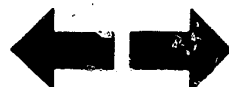
30.2 Measuring the compression loss of the engine

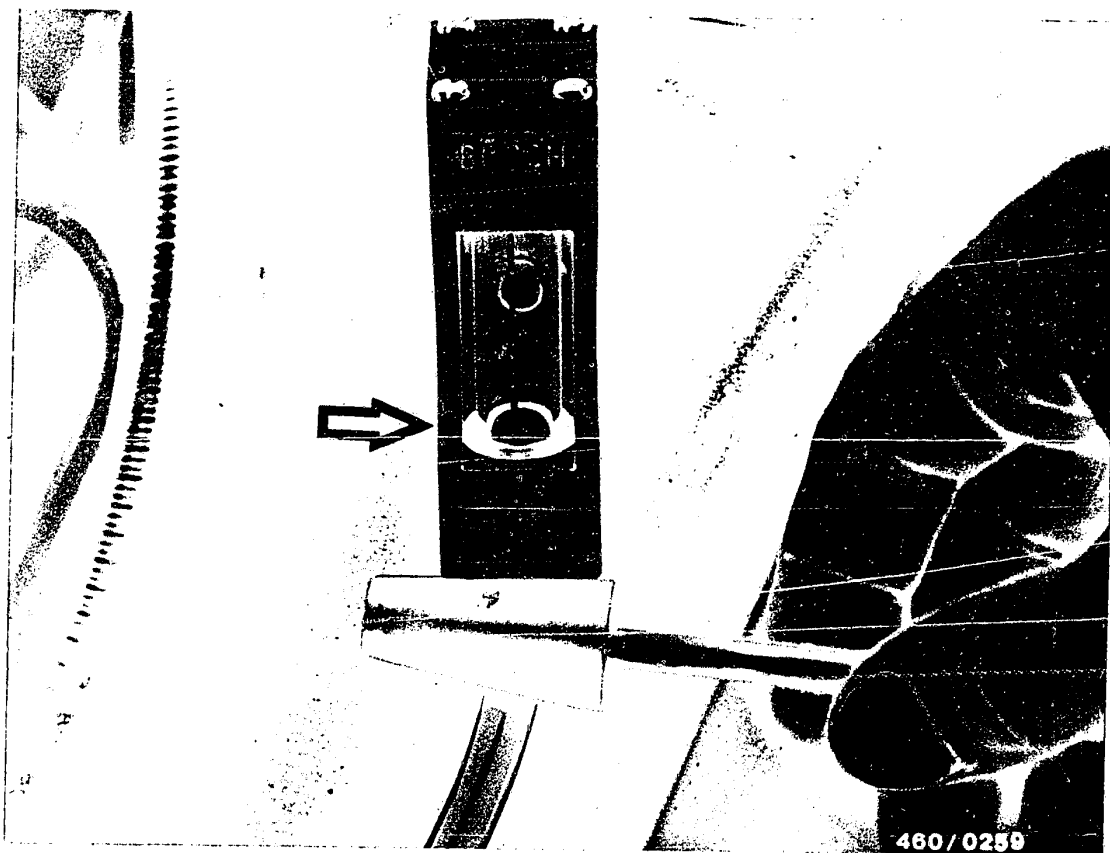
The test is performed using the BOSCH compression-loss tester 0 681 001 901 (EFAW 210 A).

For testing, the respective piston must be at TDC (TDC = top dead centre) on the compression stroke.

For setting this position, use DC detector 1 688 132 025 (included in accessories with compression-loss tester),

Perform test with engine at normal operating temperature (temperature of water approx. 80°C).





30.2.1 Set top dead centre

Remove sheathed-element glow plug from cylinder 1.

Insert rubber plug of DC detector into bore for sheathed-element glow plug.

Using magnetic clamp, mount glass cylinder in as vertical a position as possible in the engine compartment.

The piston of the unit must be easily visible.

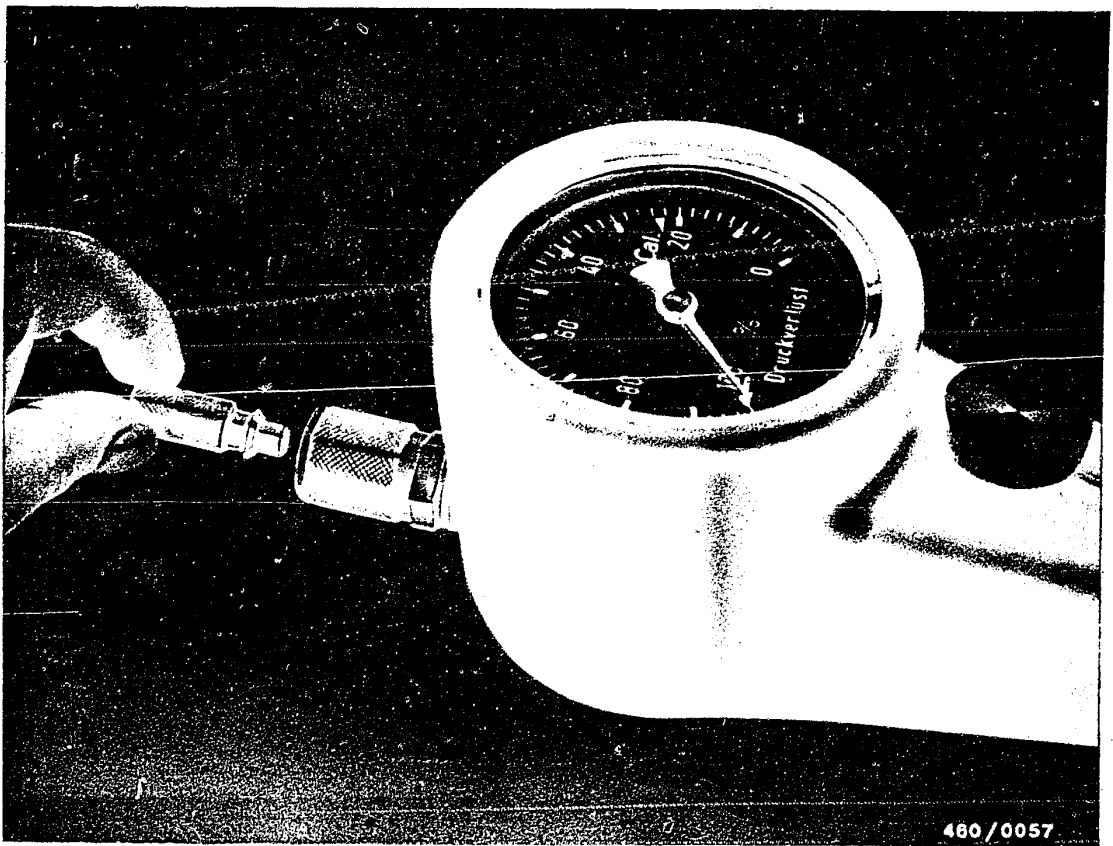
Slowly turn the engine over by hand in its direction of rotation. (If necessary, select gear and push vehicle).



On the compression stroke, the piston of the DC detector is forced upwards.

As top dead centre is passed over, the piston slides down again immediately.

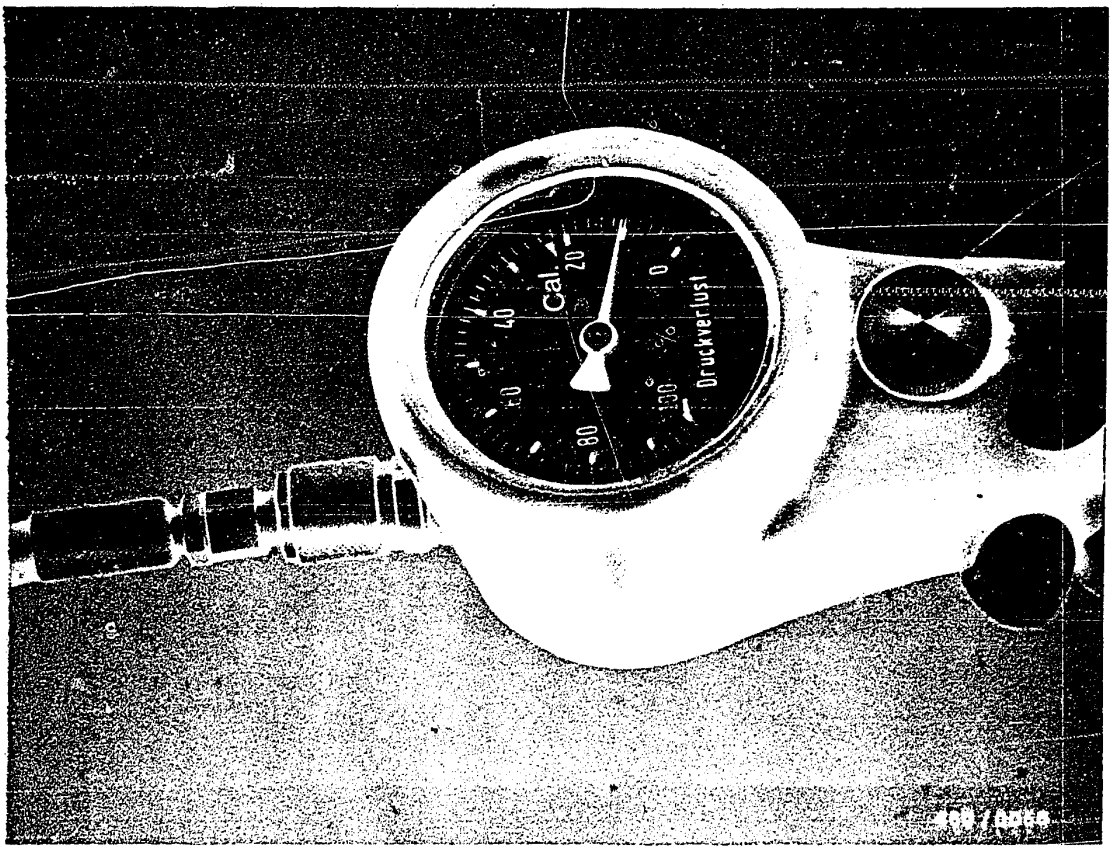
Locate top dead centre by carefully turning the engine backwards and forwards.



30.2.2 Measuring compression loss

Connect tester to compressed-air mains.
Connect calibrating nozzle 1 680 363 036. Set a compression loss of $23 \pm 1\%$ (marking "Cal") at the knurled thumbscrew on the pressure-regulating valve.
Disconnect calibrating nozzle.
Instrument indicator must show approximately 0% compression loss (equipment check).





Nozzle-holder assemblies removed. Screw connecting nipple into opening of nozzle-holder assembly.
Screw in fitting and mount test hose.
Select gear and pull on handbrake.
Connect test hose to tester.
Read off compression lost in % on instrument.

Note:

Before testing the next cylinder, turn the engine over briefly without preheating using the starting motor so that the oil film re-forms.



30.2.3 Evaluation of test

The compression loss indicated should not exceed 25%.

Differences of 10% between the individual cylinders can be ignored.

The causes of greater losses can be located because the air makes a noise as it escapes.

Listen at the following points:

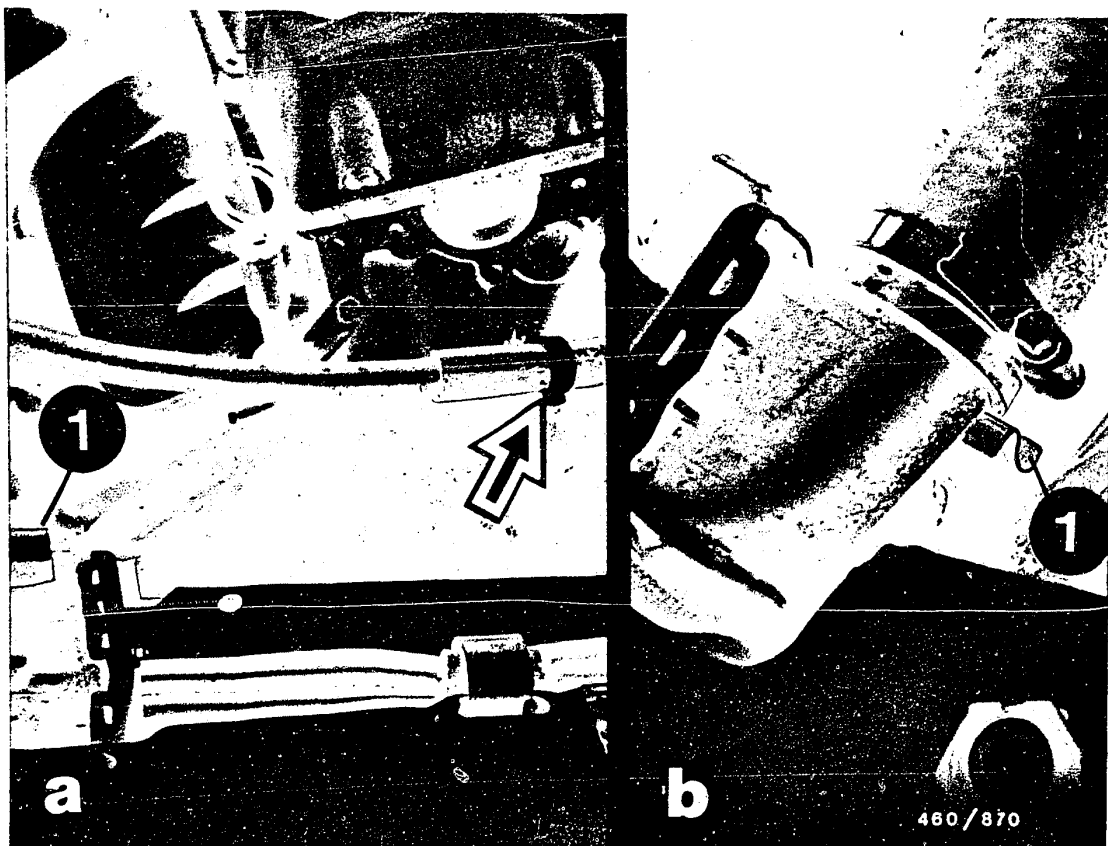
<u>Location of noise</u>	<u>Possible trouble</u>
Intake manifold (remove air filter)	Intake valve
Exhaust manifold	Exhaust valve
Oil filler neck on engine	Pistons, piston rings
Cooling water filler neck (air bubbles)	Cylinder head gasket

In order to trace the trouble even more accurately, fill approximately 2-3 cm³ of engine oil into the cylinder. Repeat test.

If there is a clear decrease in compression loss during this test, then the fault lies with the piston or with the piston rings.

New engines which have not yet been run in (less than 5000 km) may show higher compression losses than after the running-in period.





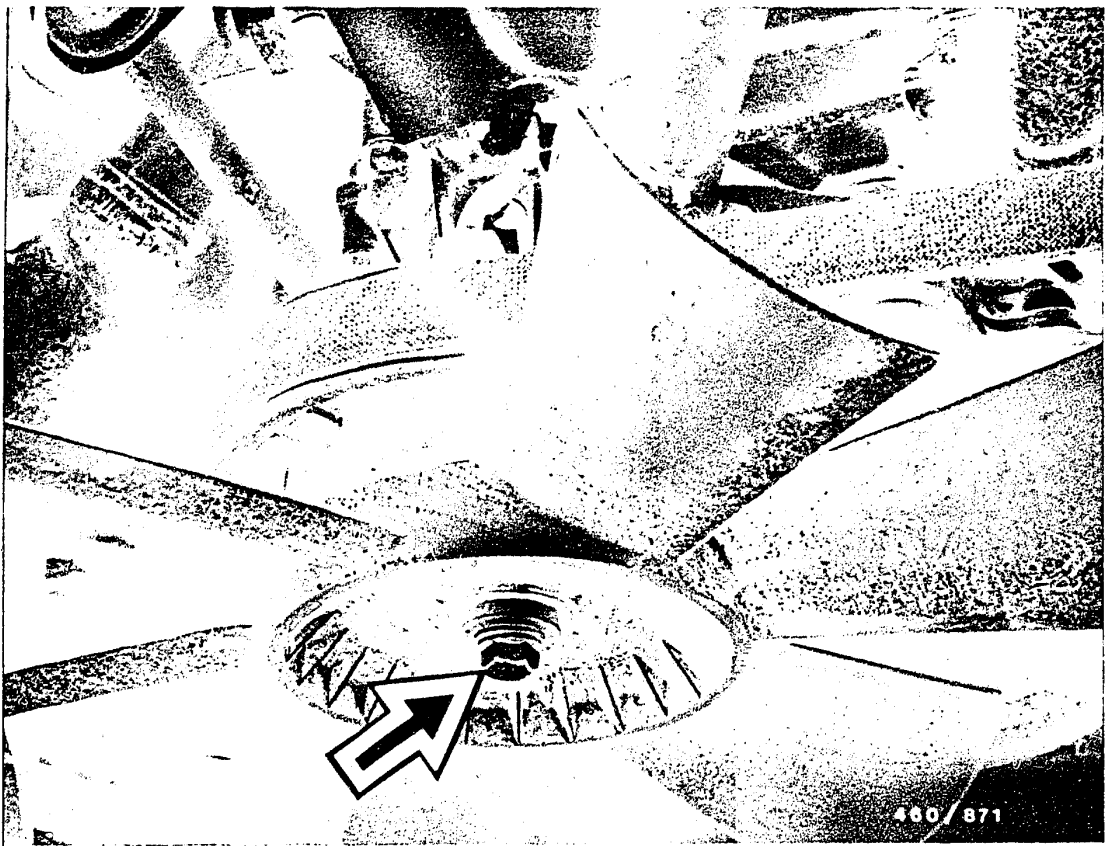
1 = Fan chrouds

31. WORK ON FUEL INJECTION PUMP

31.1 Remove fuel injection pump

Disconnect negative cable from battery.
Remove fan shrouds (see pictures a and b) and hose binder (arrow, picture a).





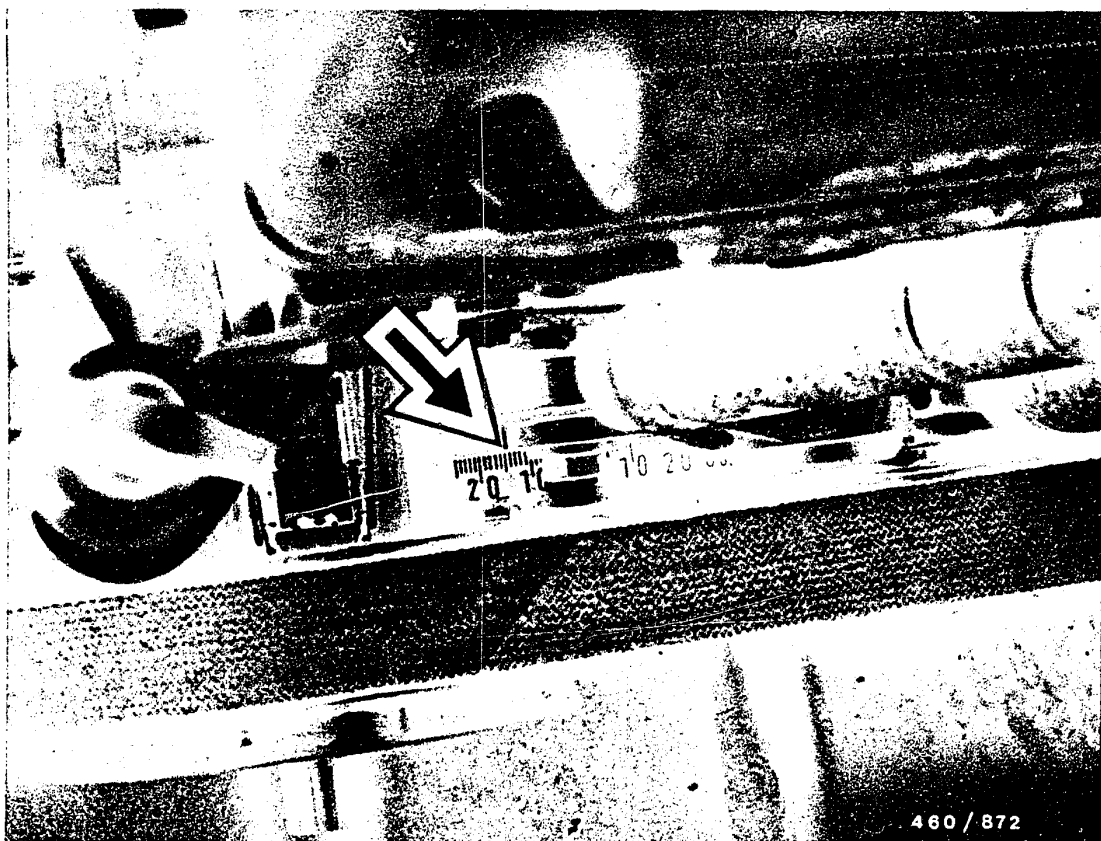
Unscrew fan fastening screw (arrow).
Remove fan and fan cover on radiator.
Remove front noise capsule.

J10

Remove fuel injection pump

MB 124/126





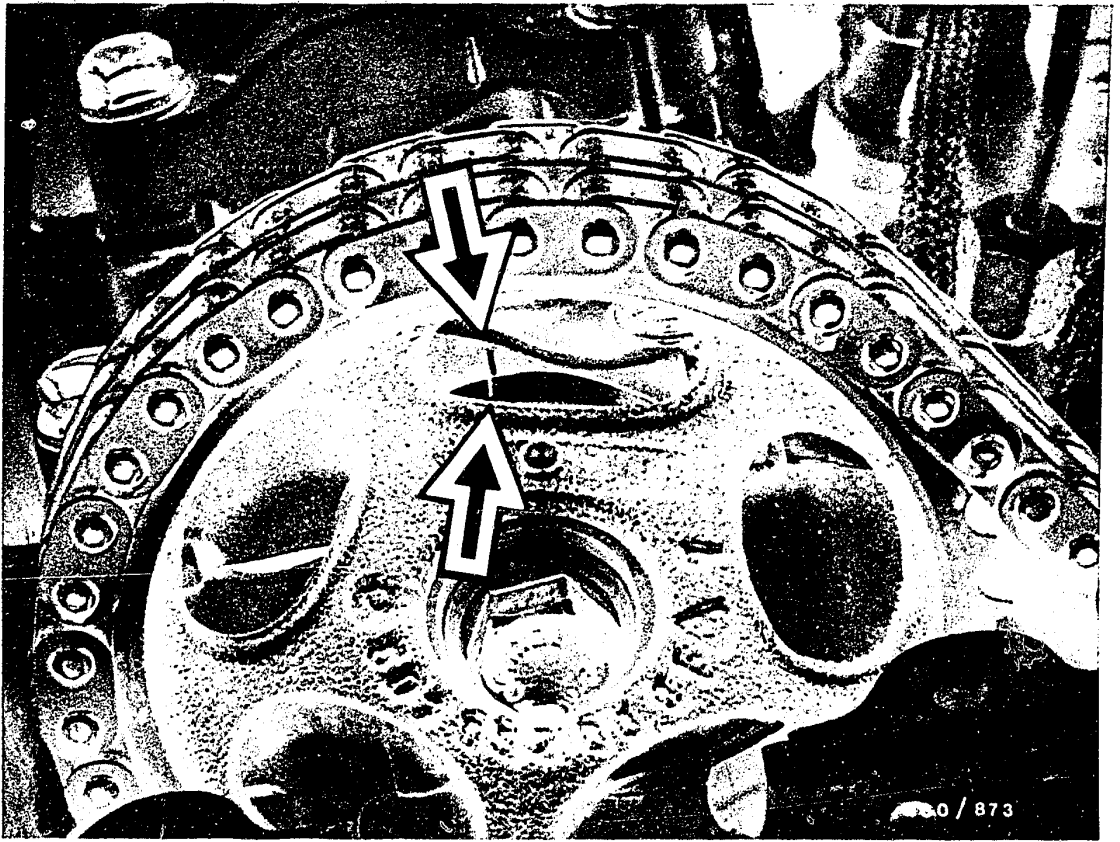
Turn crankshaft in engine direction of rotation to 15° ATDC on cylinder 1 (see picture, arrow).

J11

Remove fuel injection pump

MB 124/126



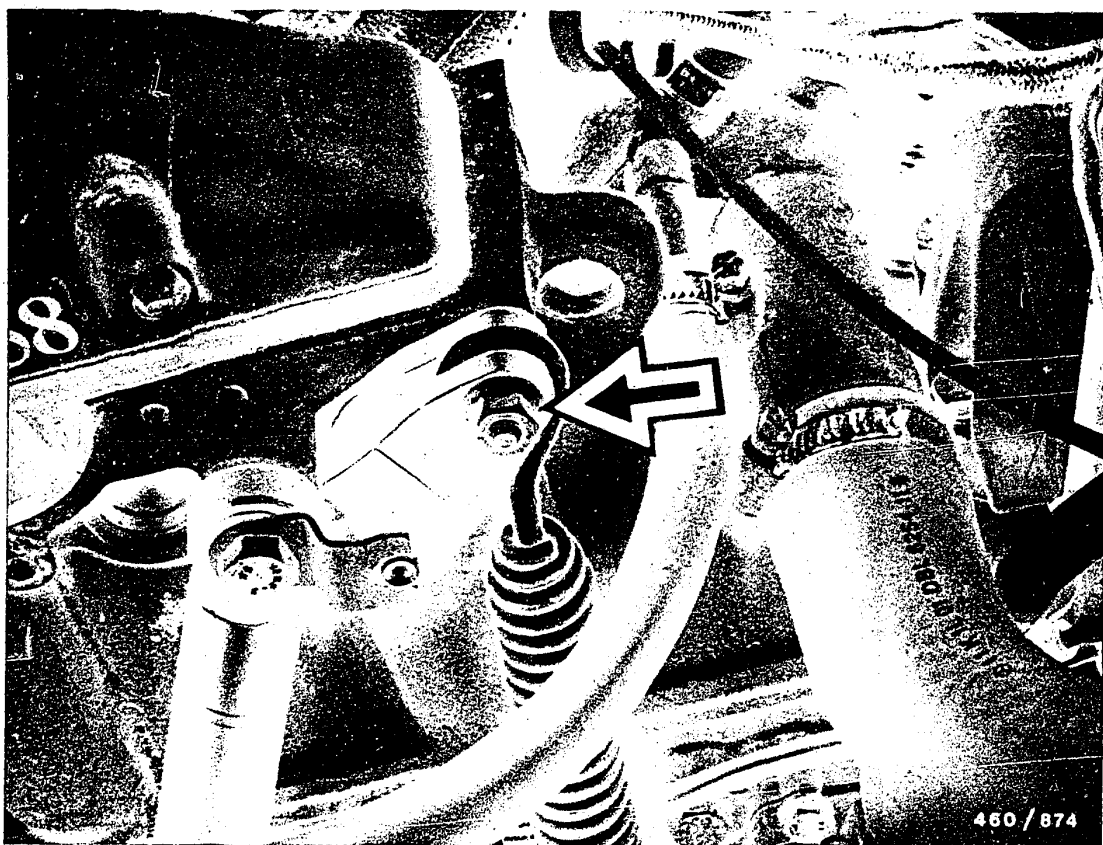


Note:

With the piston of cylinder 1 at TDC, the notch on the front collar of the camshaft must align with the rib on the 1st camshaft bearing (see picture, arrows).

Valves of cylinder 4 are on overlap. (Visible after removing the cylinder head cover).





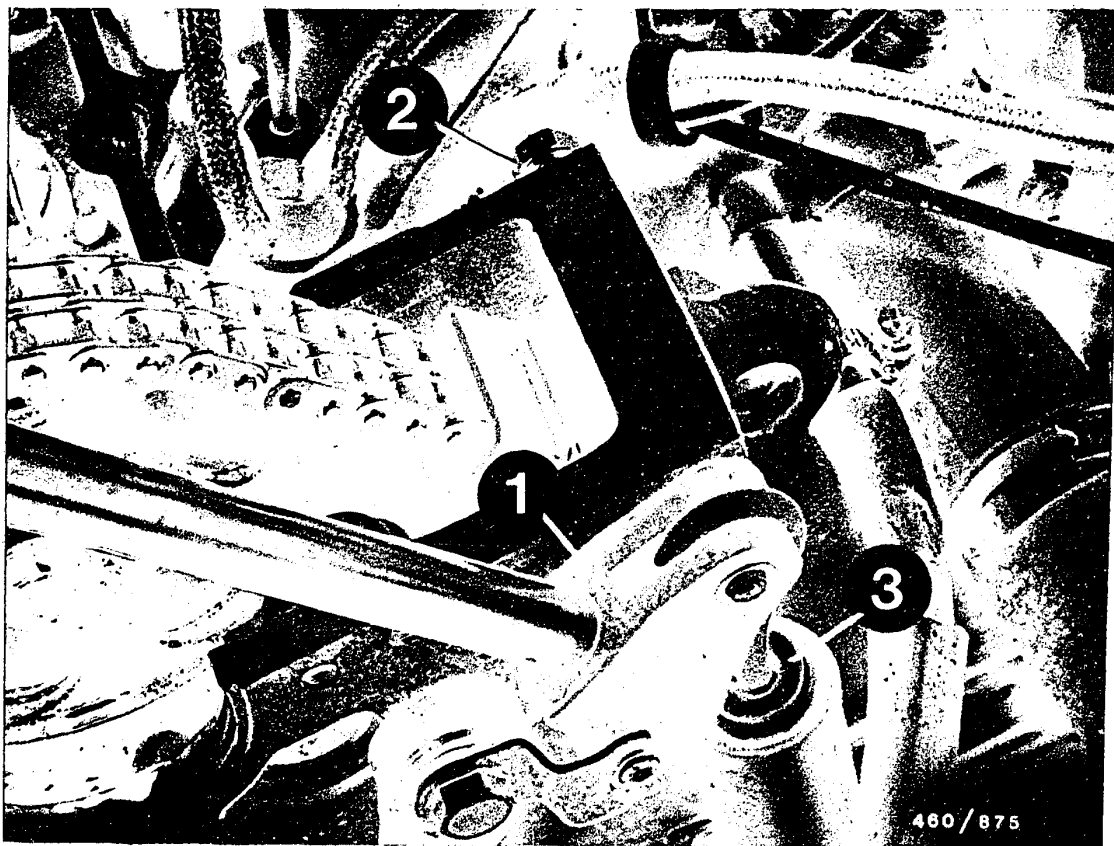
Unscrew belt tensioner fastening nut (see picture, arrow).

J13

Remove fuel injection pump

MB 124/126



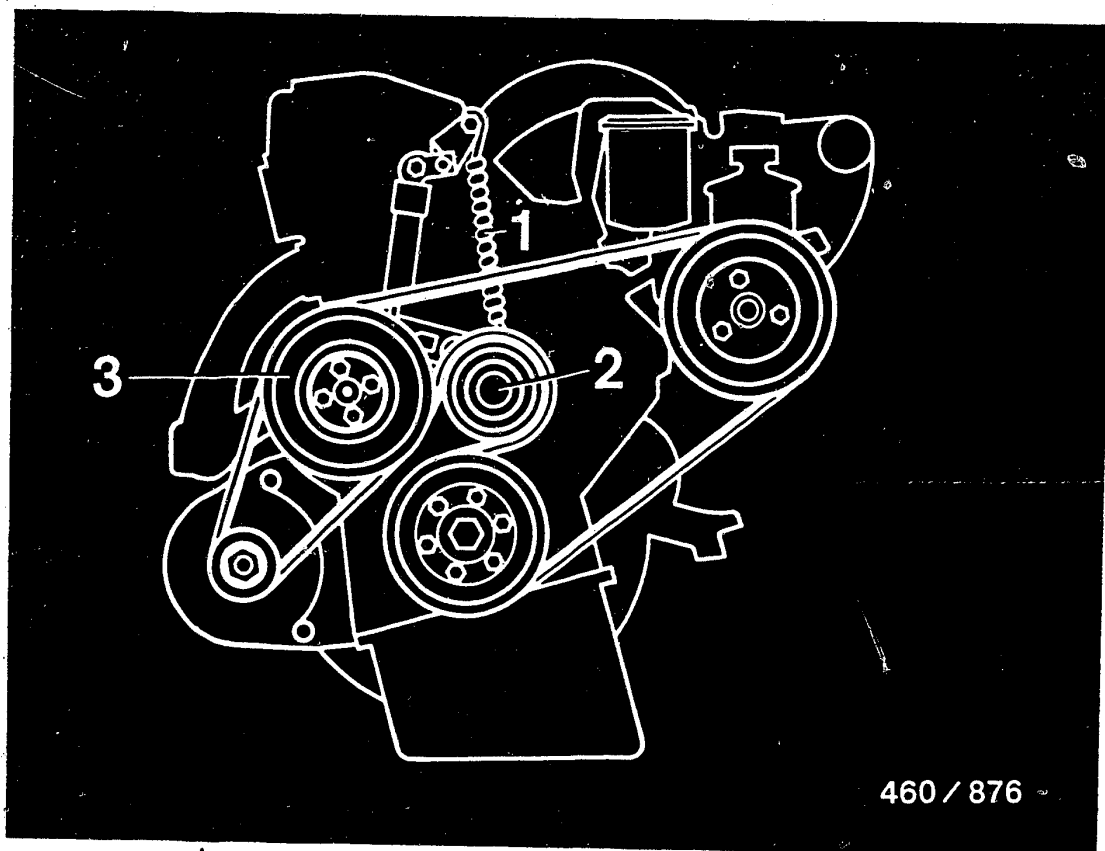


- 1 = Spring tensioning lever
- 2 = Fastening screw
- 3 = Extension spring

Stick lever or mandrel (12 - 13 mm \varnothing , approx. 300 mm long) into bore on spring tensioning lever (1). Press lever slightly to the left until fastening screw (2) can be pushed back.

Relax extension spring (3). To do this, slowly pivot lever to the right.





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- 1 = Extension spring
- 2 = Tensioning roller
- 3 = Coolant pump

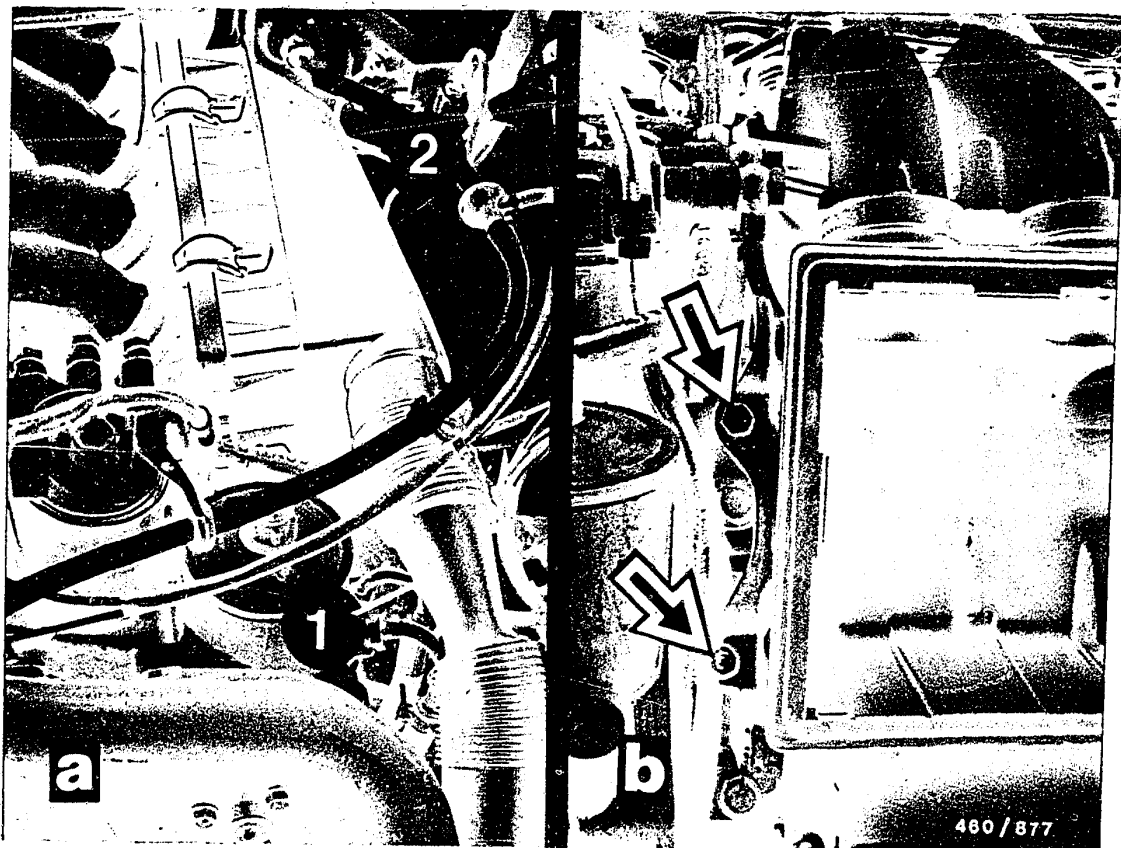
Unhook extension spring from tensioning roller.
Push back tensioning roller and take off ribbed V-belt.

J15

Remove fuel injection pump

MB 124/126





1 = Air-intake dome
2 = Air filter cover

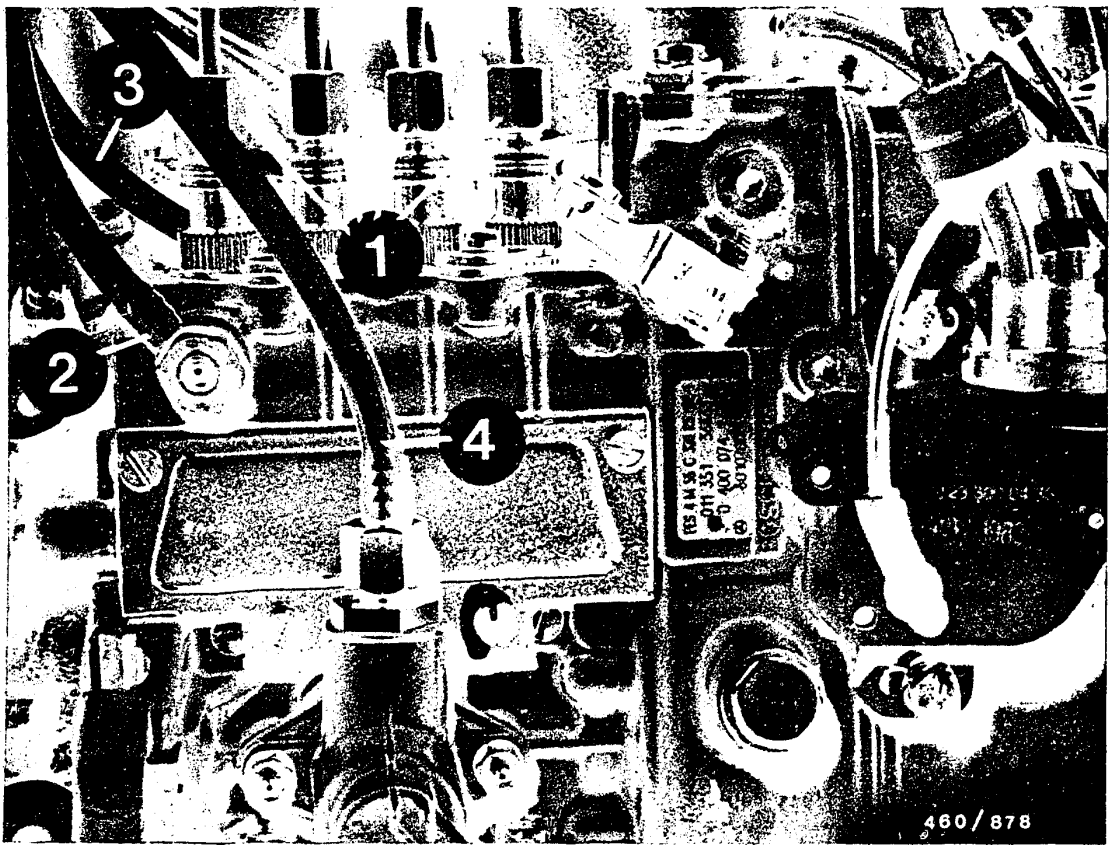
Remove air-intake dome and air filter cover (loosen 6 fastening clamps).
Remove the fastening nuts of the side holders for air guide housing (see picture, arrows).

J16

Remove fuel injection pump

MB 124/126



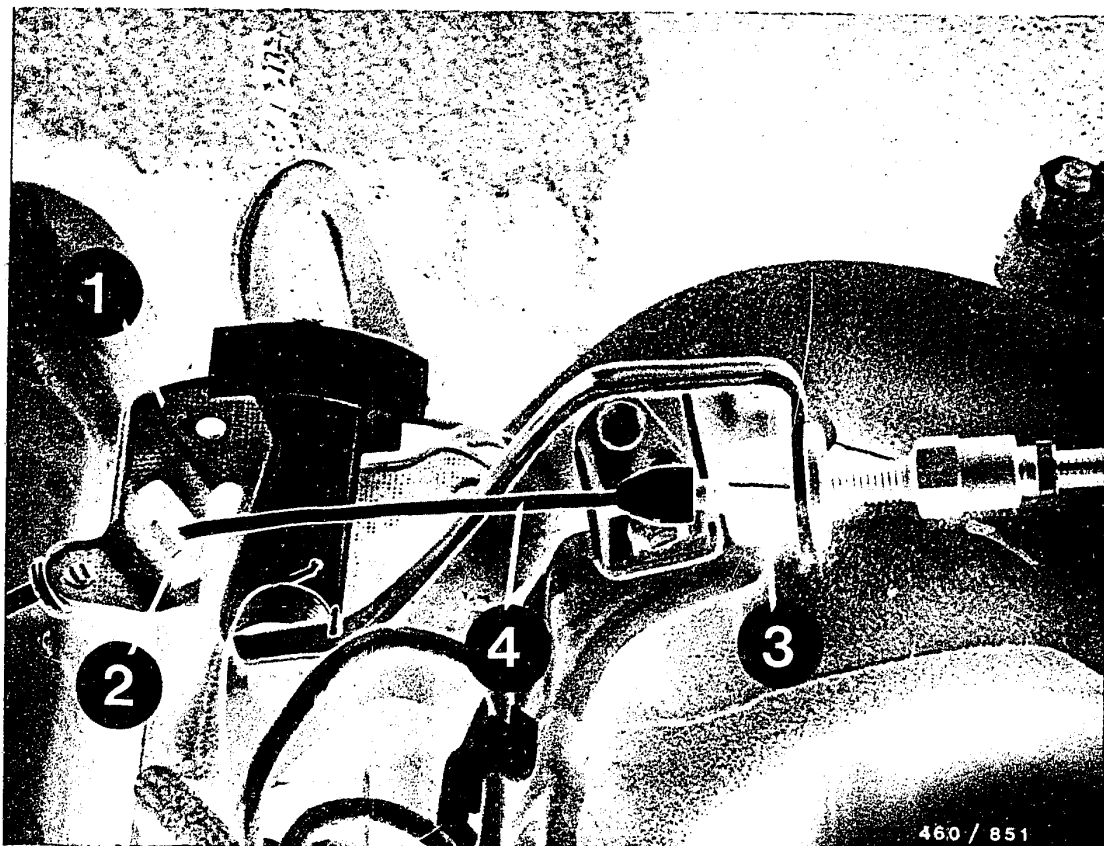


- 1 = Injection lines
- 2 = Fuel inlet line
- 3 = Fuel return line
- 4 = Inlet line to fuel filter

Loosen injection lines.

Unscrew fuel inlet line, fuel return line and inlet line to fuel filter.

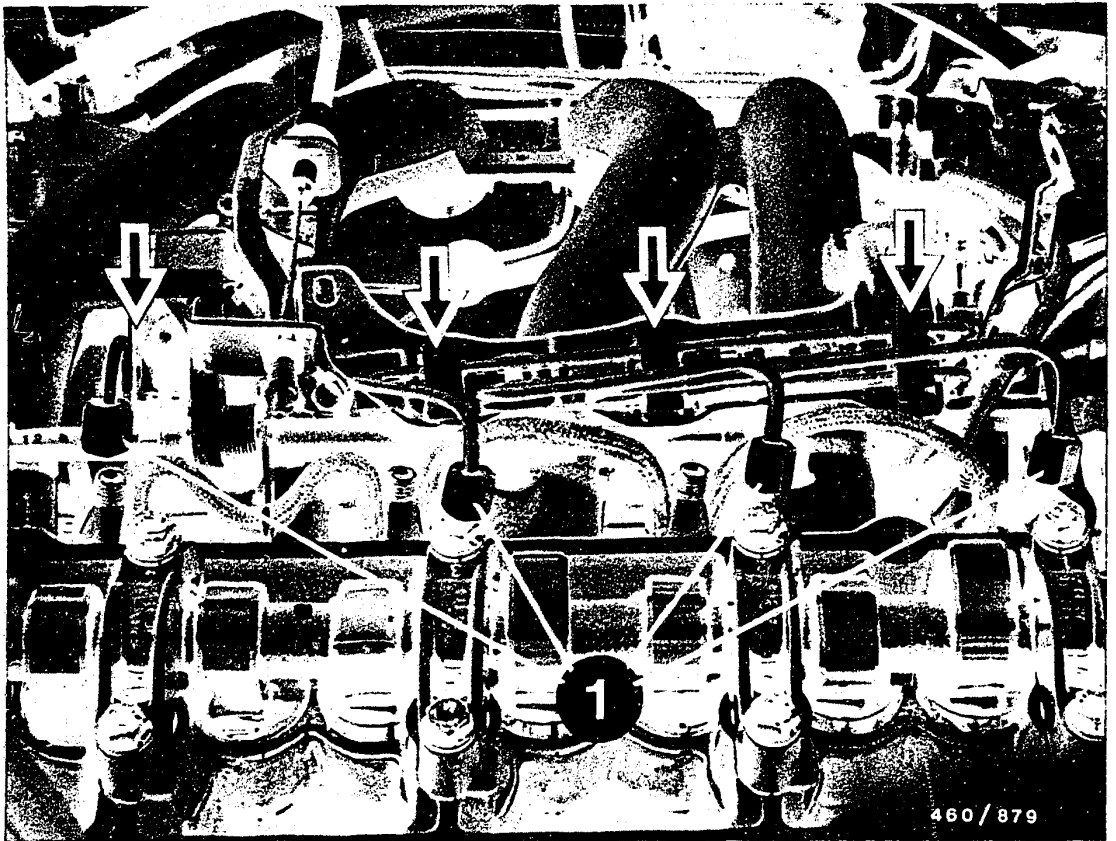




- 1 = Bell crank
- 2 = Guide piece
- 3 = Expansion clamp
- 4 = Cable

Press out slotted guide piece on bell crank.
Press together expansion clamp.
Unhook cable and place to one side.





1 = Injection lines

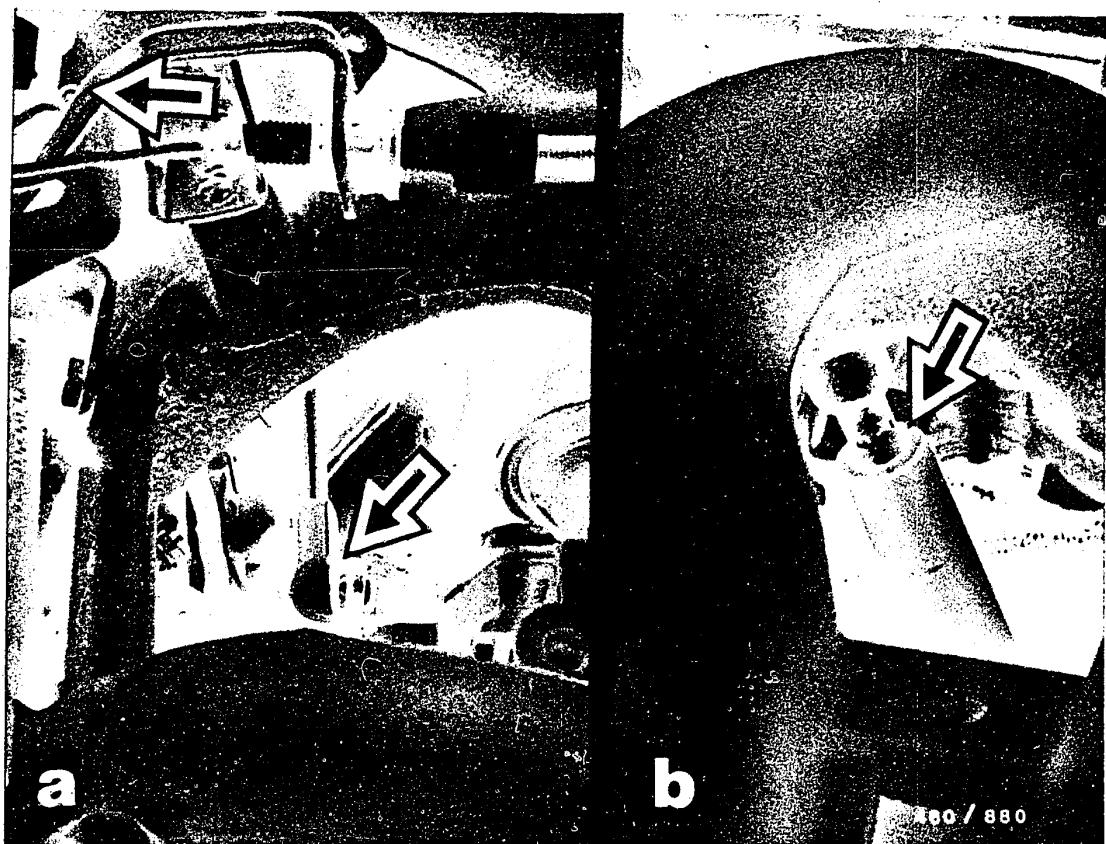
Unscrew injection lines from nozzle-holder assemblies. Remove fastening screws of injection lines and plastic clip (see picture, arrows).

J19

Remove fuel injection pump

MB 124/126





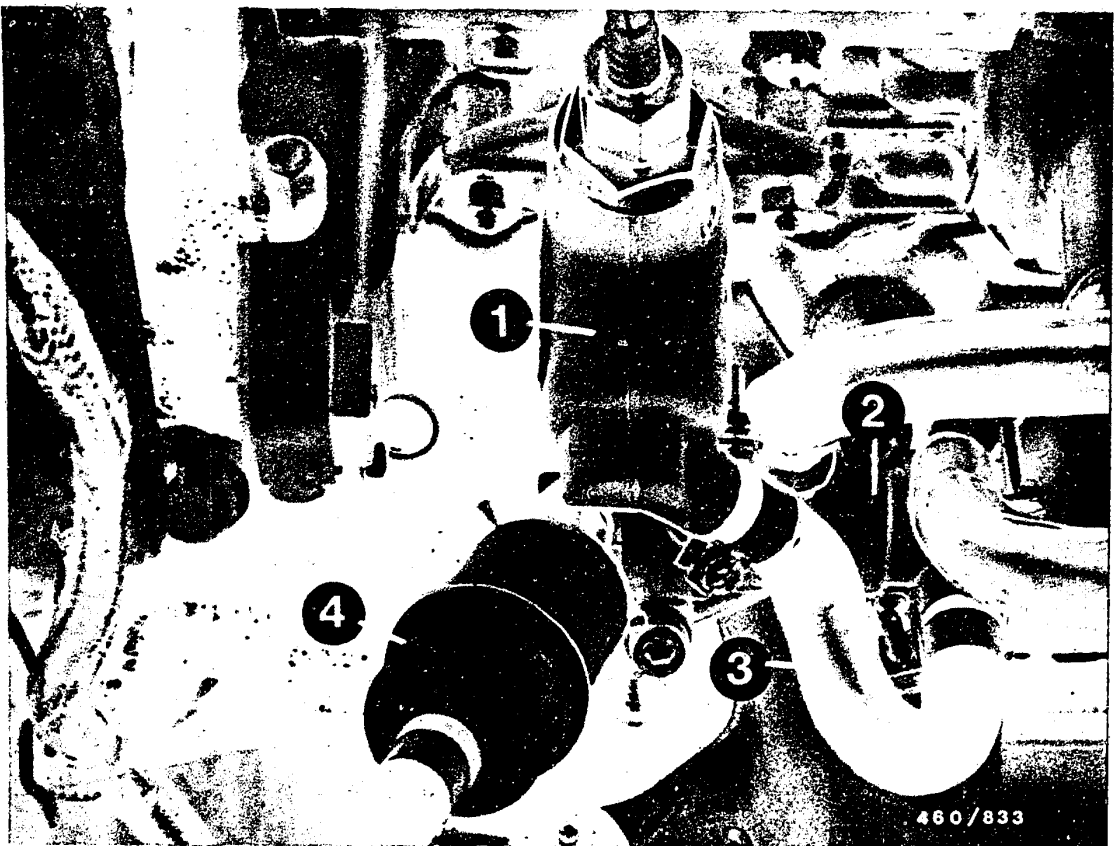
Unhook regulating linkage (arrows, picture a), damper (arrow, picture b).

J20

Remove fuel injection pump

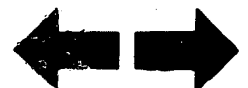
MB 124/126

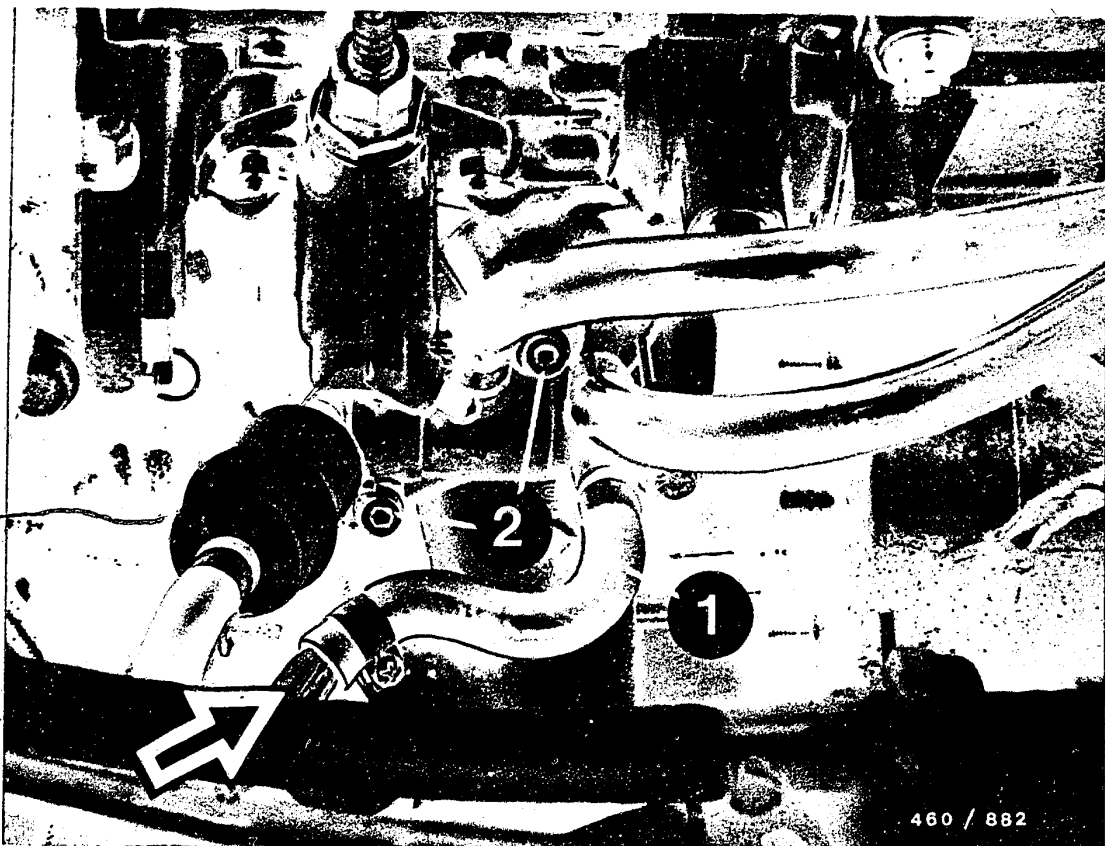




- 1 = Fuel supply pump
- 2 = Fuel thermostat
- 3 = Suction line
- 4 = Fuel prefilter

Unscrew suction line to fuel supply pump.





1 = Suction line

2 = Thermostat fastening screws

Close suction line with mandrel (arrow).

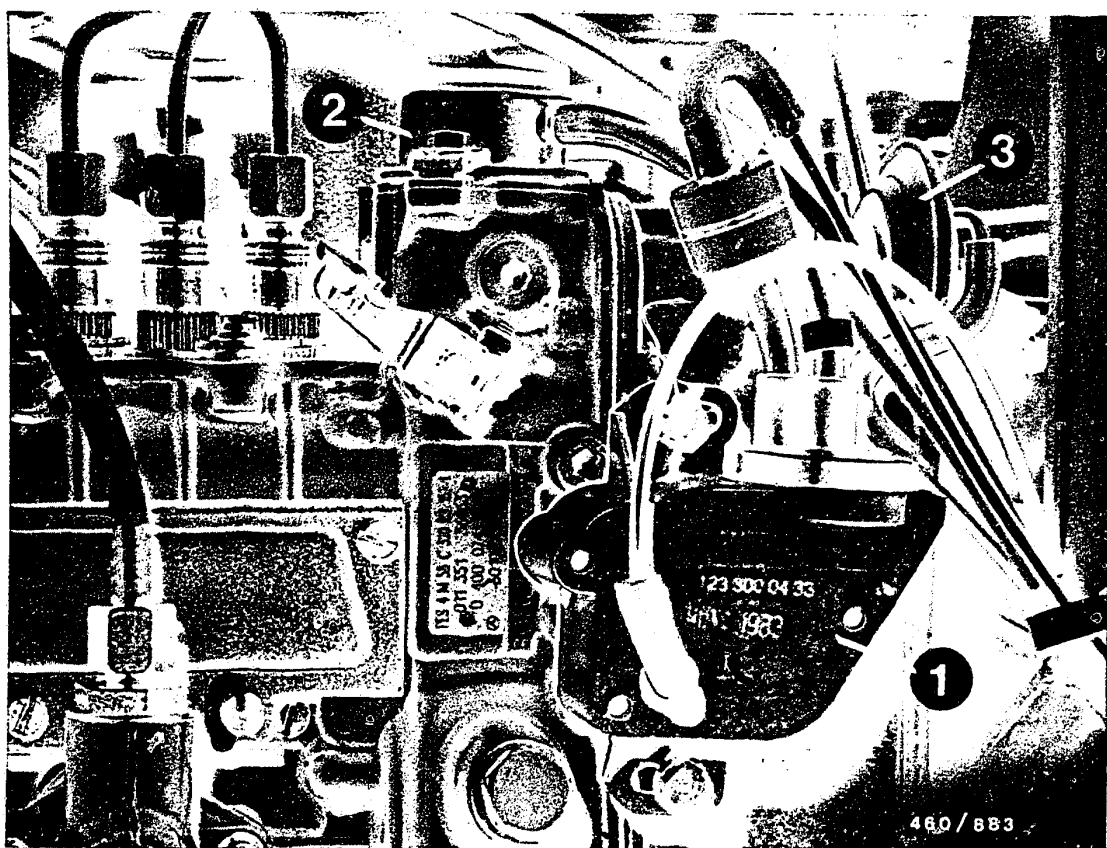
Unscrew fastening screws from fuel thermostat.

J22

Remove fuel injection pump

MB 124/126

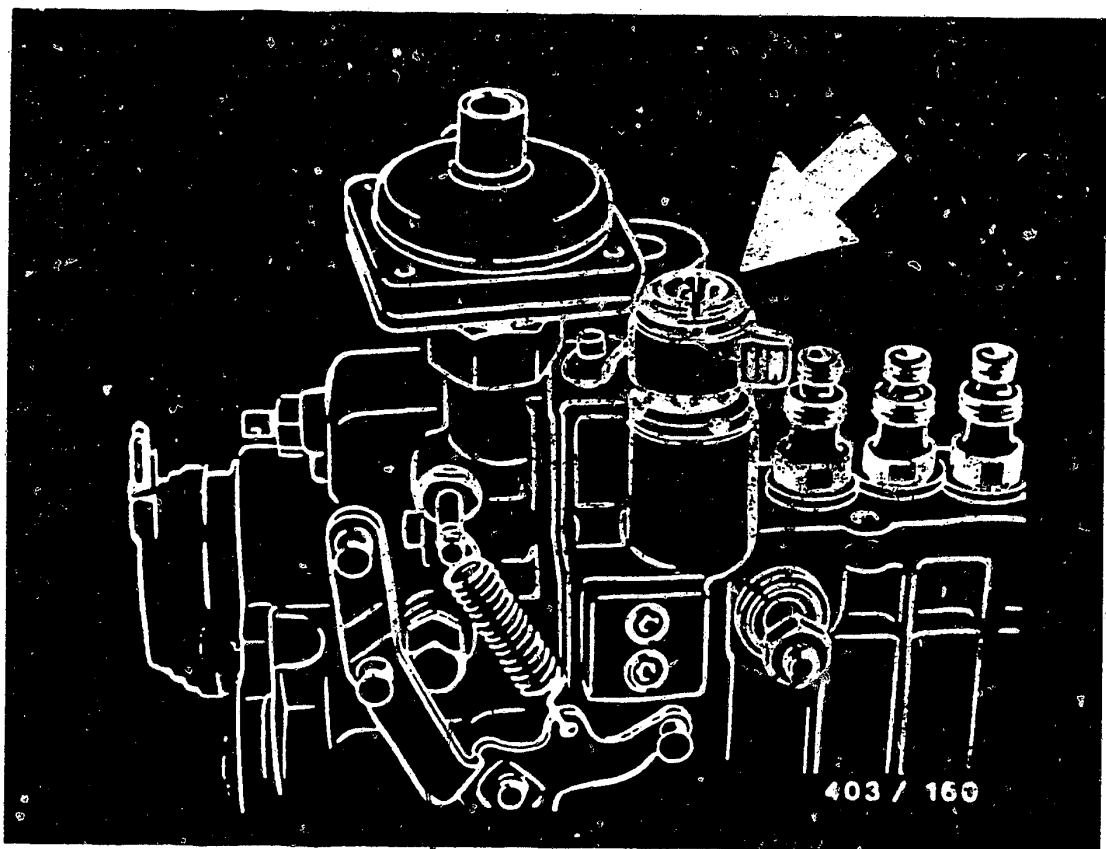




- 1 = Vacuum-control valve
- 2 = Shutoff box
- 3 = Vacuum unit

Disconnect vacuum lines from vacuum unit for idle increase, from shutoff box and, on vehicles with automatic transmission, from vacuum-control valve.





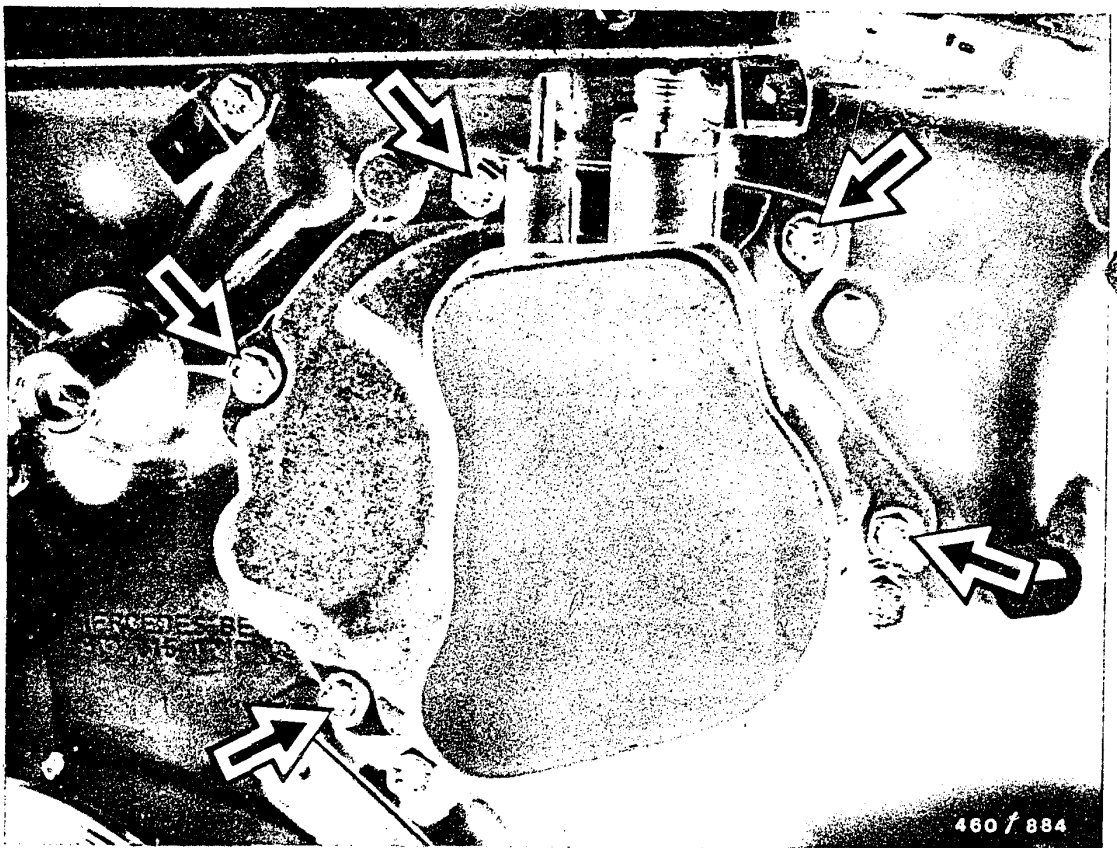
Turn mounting (arrow) and remove
control-rod-travel-sensor connecting lead.

J24

Remove fuel injection pump

MB 124/126





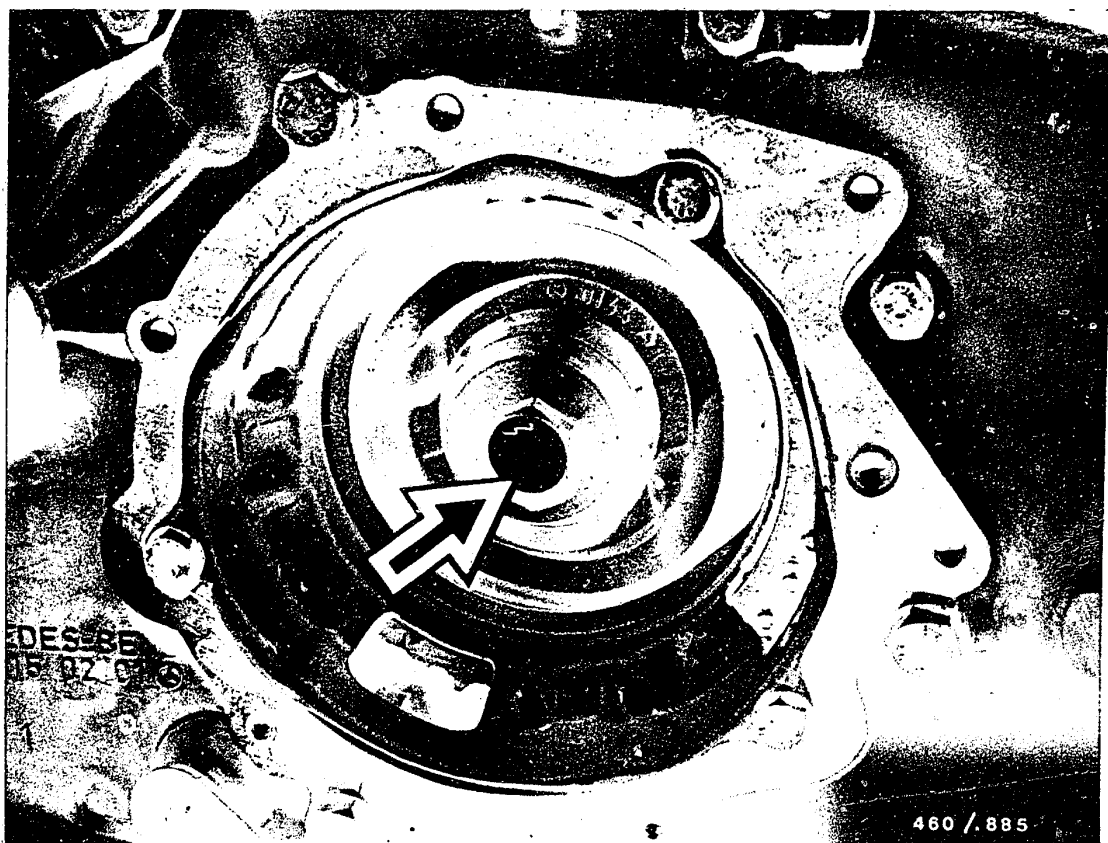
Remove vacuum pump fastening screws (see picture, arrows). Remove vacuum pump.

K1

Remove fuel injection pump

MB 124/126





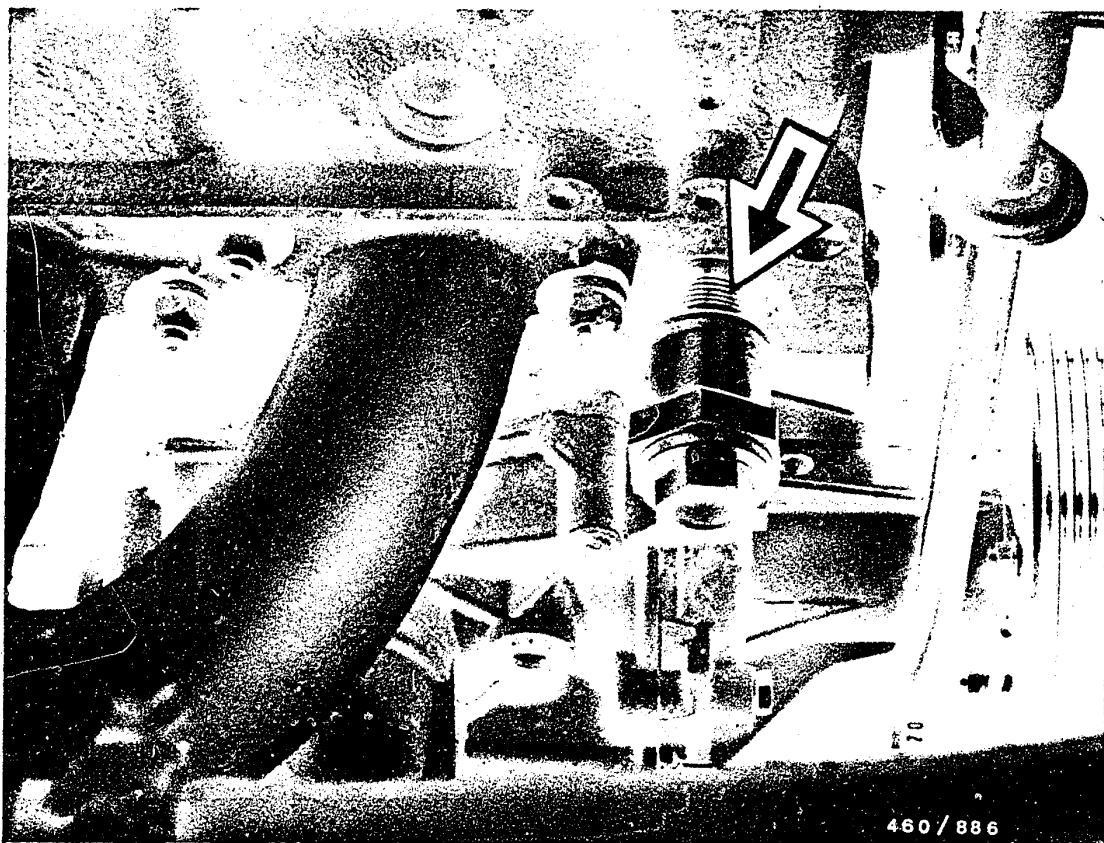
Only loosen central fastening screw of timing device
(see picture, arrow) (caution: LEFT-HAND THREAD)
To do this, hold the crankshaft to stop it from turning.

K2

Remove fuel injection pump

MB 124/126





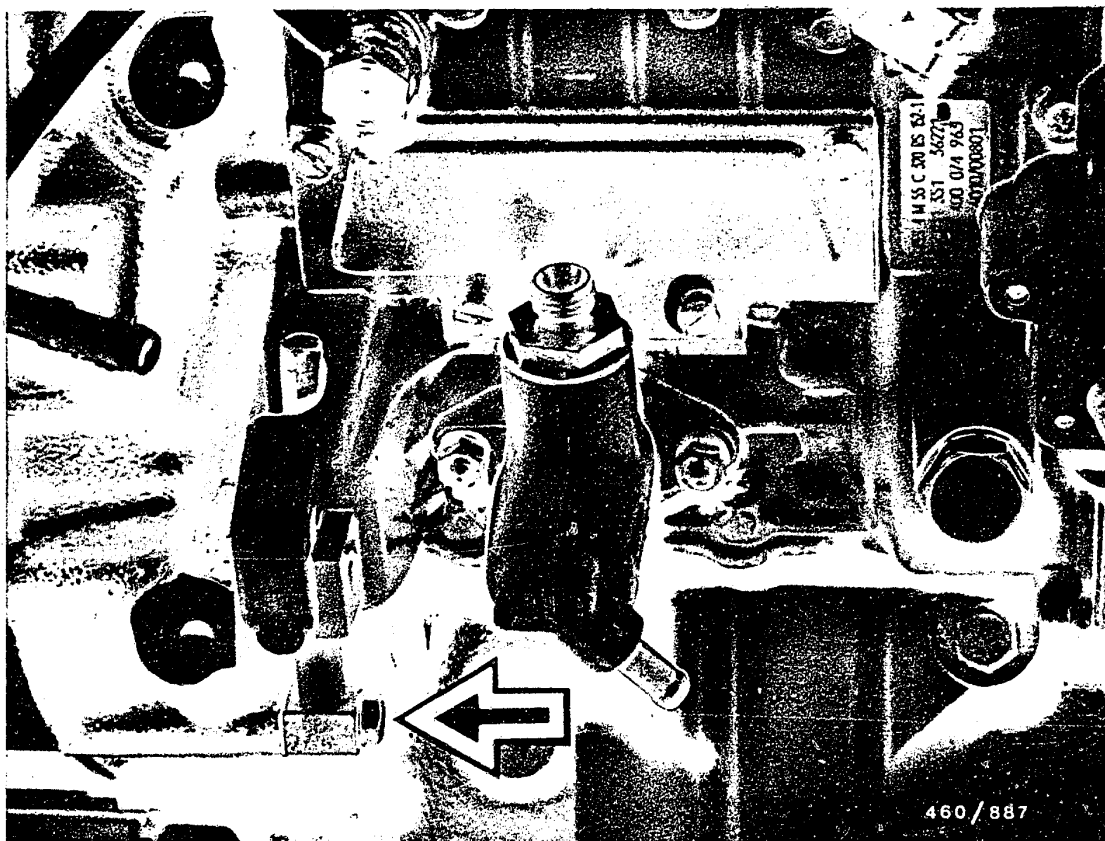
Loosen chain tensioner (see picture, arrow) (do not remove).

K3

Remove fuel injection pump

MB 124/126





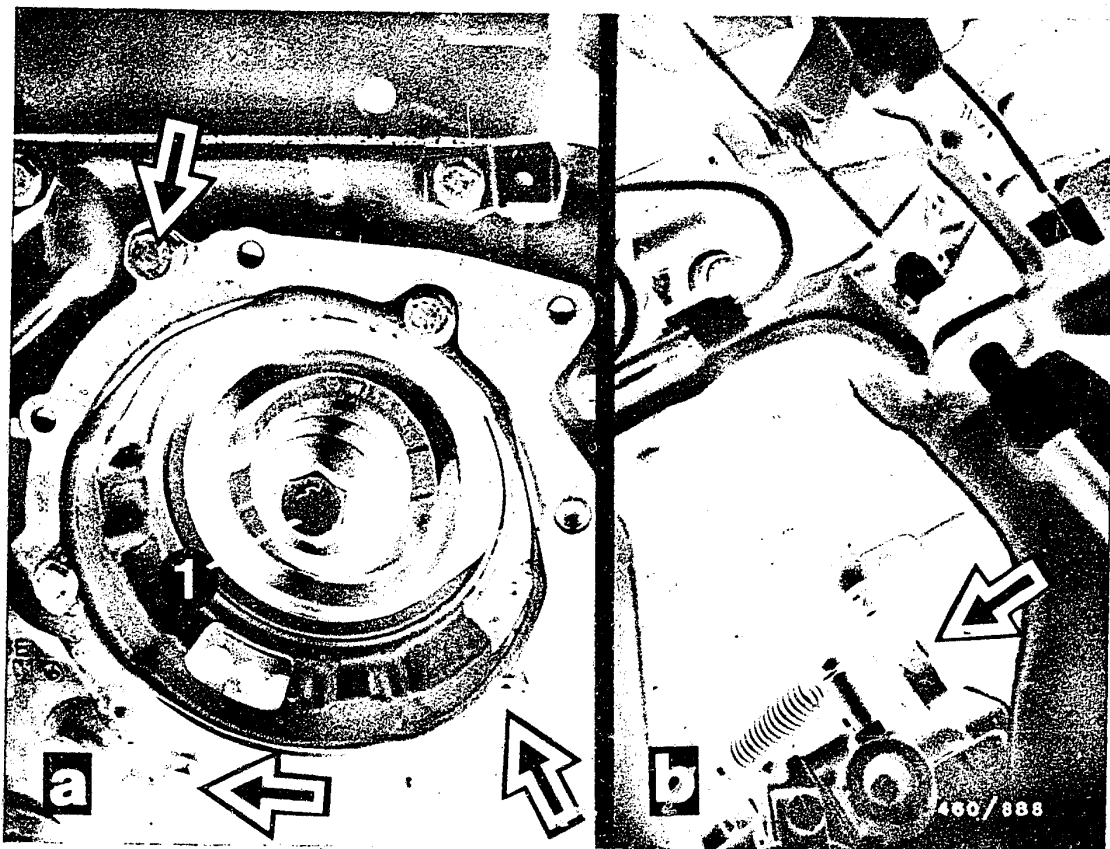
Only loosen setting device for setting the start of delivery (arrow). Do not remove fastening screw.

K4

Remove fuel injection pump

MB 124/126





1 = Central fastening screws of timing device (left-hand thread)

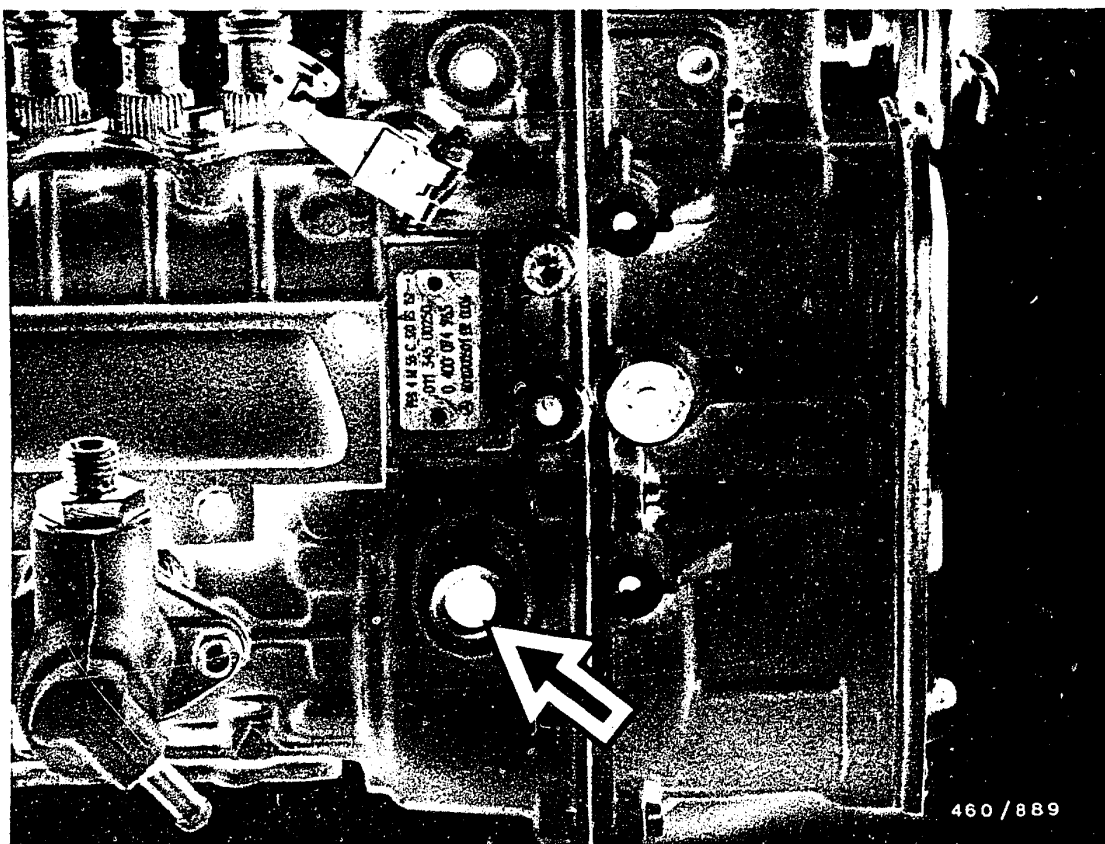
Remove central fastening screw (left-hand thread).
Remove injection-pump fastening screws at drive end (arrows - picture a) and on support bracket (arrow, picture b).

Withdraw injection pump toward the rear.

Note:

Do not change position of installed timing device.





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32. INSTALL FUEL INJECTION PUMP

32.1 Preparations

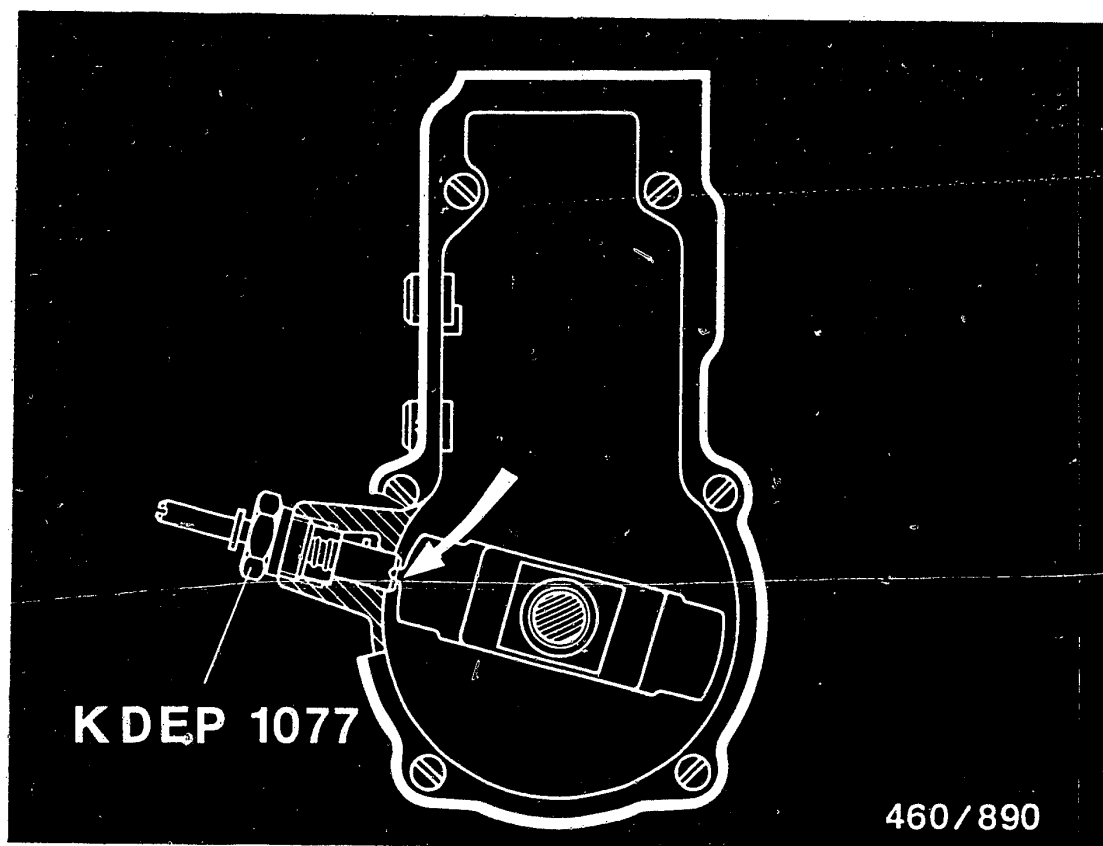
Remove screw plug (arrow) (already removed in picture).
Do not yet introduce injection pump into engine.

K6

Install fuel injection pump

MB 124/126





Turn injection-pump camshaft with drive coupling until the lug (see picture, arrow) of the governor is visible at the bore.

In this position, insert holding device KDEP 1077 until it can be felt to latch.

Tighten nut by hand.

Note:

Danger of damage to injection pump.

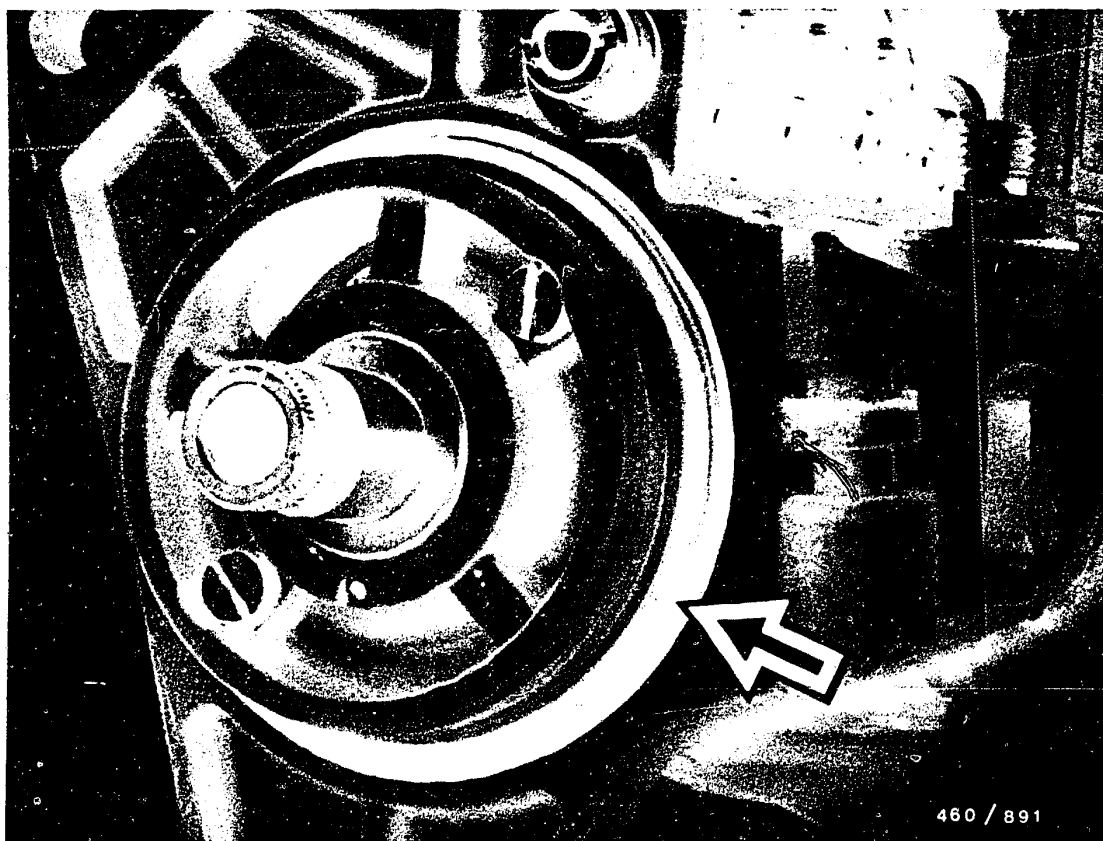
Immediately after installing the injection pump, remove holding device KDEP 1077.

K7

Install fuel injection pump

MB 124/126





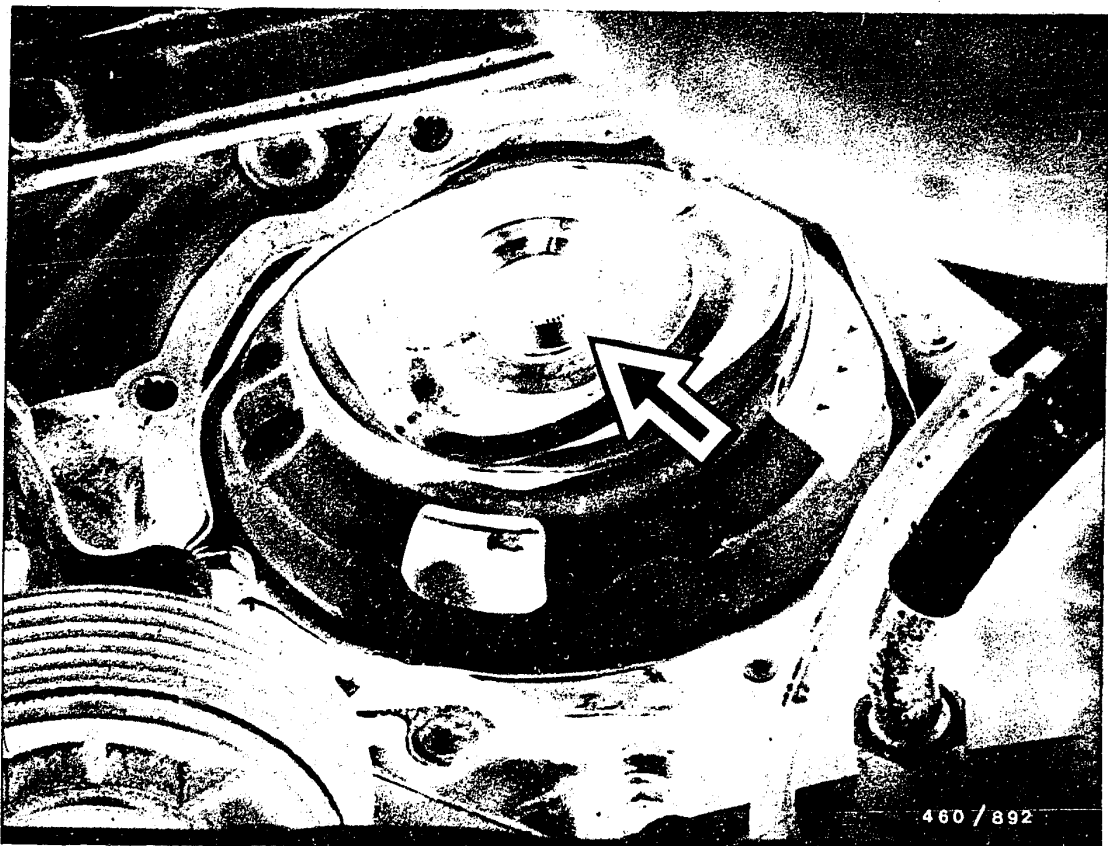
Before installing the injection pump, check whether the O-ring is fitted onto injection-pump flange (see picture, arrow).

K8

Install fuel injection pump

MB 124/126





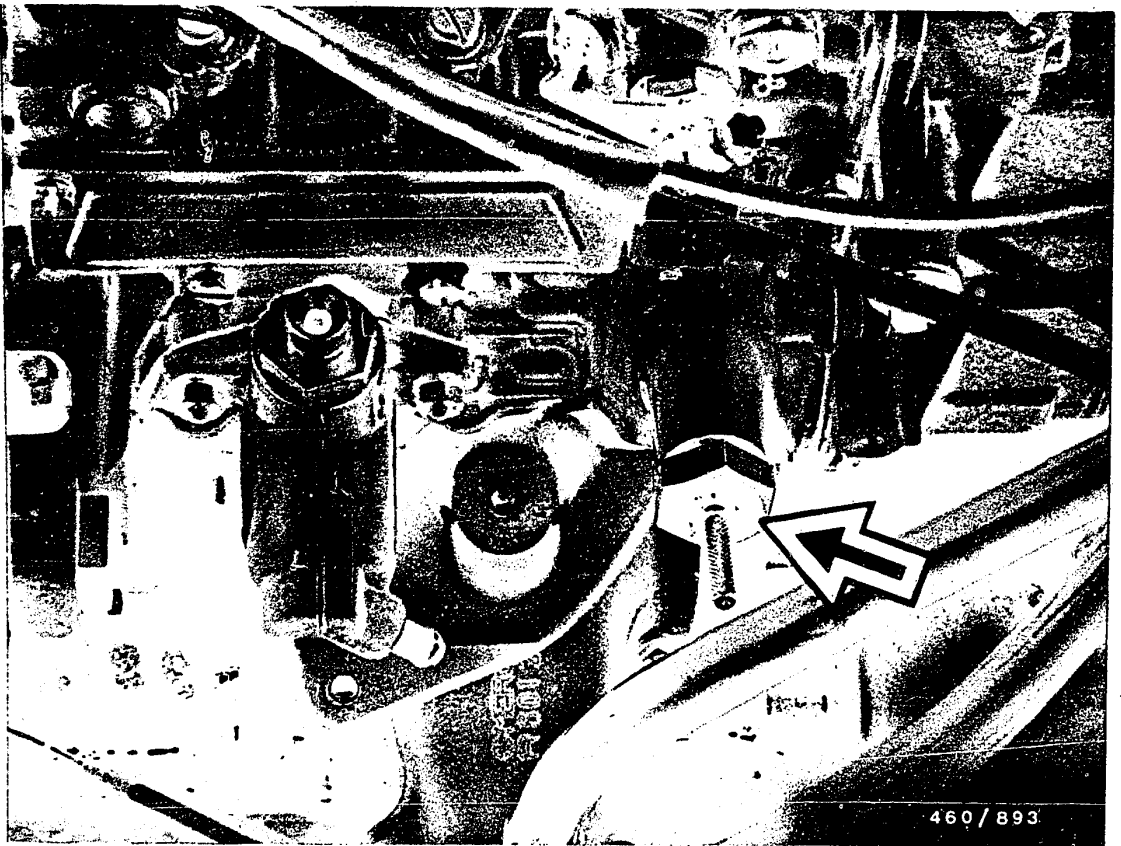
When installing the injection pump, make sure that the timing device (see picture, arrow) is not changed in its position.

K9

Install fuel injection pump

MB 124/126





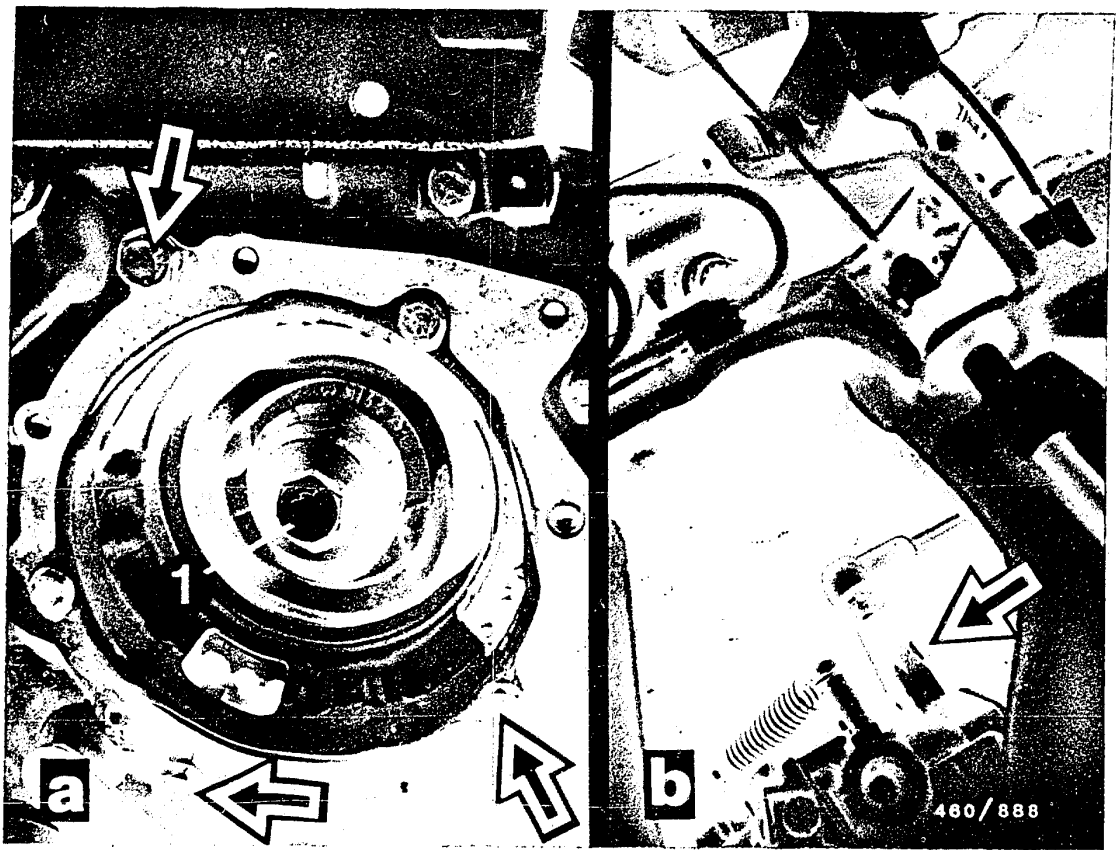
Introduce injection pump with holding device KDEP 1077 (see picture, arrow) into engine block so that injection-pump fastening screws are in the centre of the slots (this makes it possible to turn to both sides for fine adjustment).

K10

Install fuel injection pump

MB 124/126





1 = Central fastening screw on timing device (left-hand thread)

Finger-tighten fastening screws at drive end (picture a) and on support bracket (arrow, picture b).

Remove holding device KDEP 1077.

Mount screw plug with seal (Daimler Benz service part).

Insert central fastening screw (picture a) and tighten to 40 - 50 Nm. Caution: LEFT-HAND THREAD.

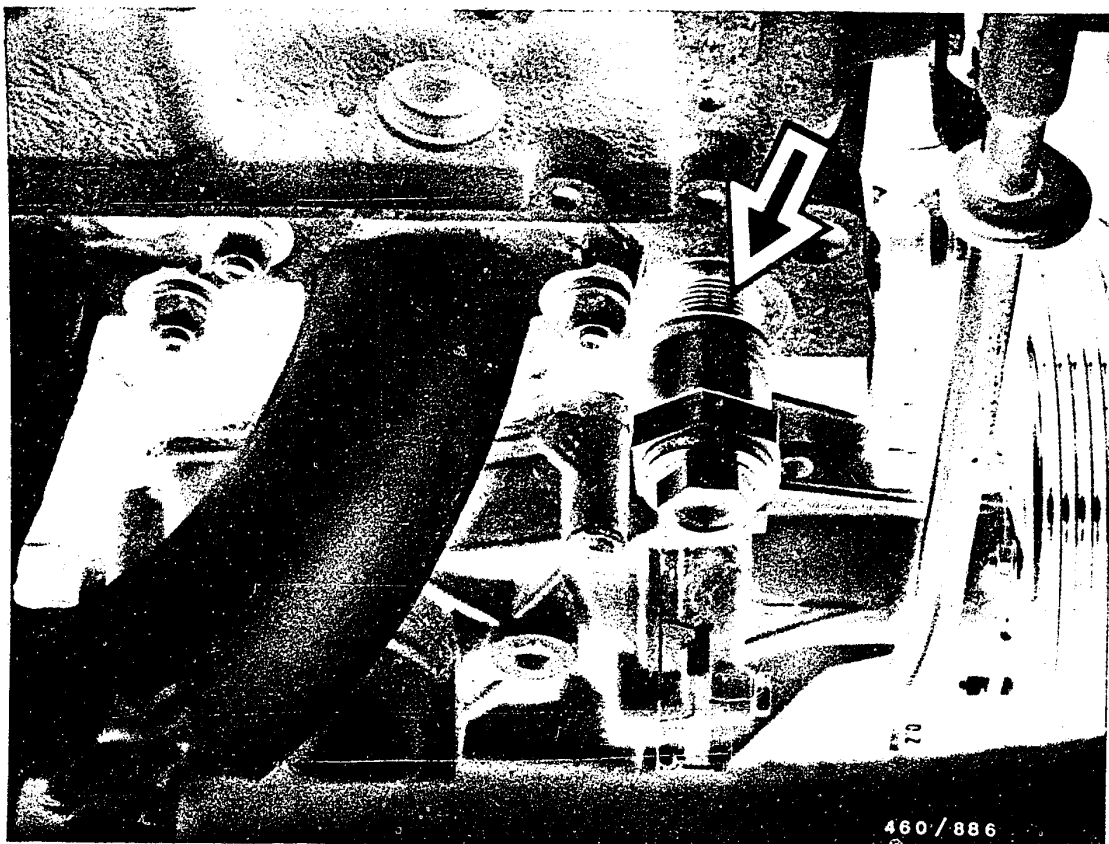
Hold crankshaft so that it cannot turn.

K11

Install fuel injection pump

MB 124/126





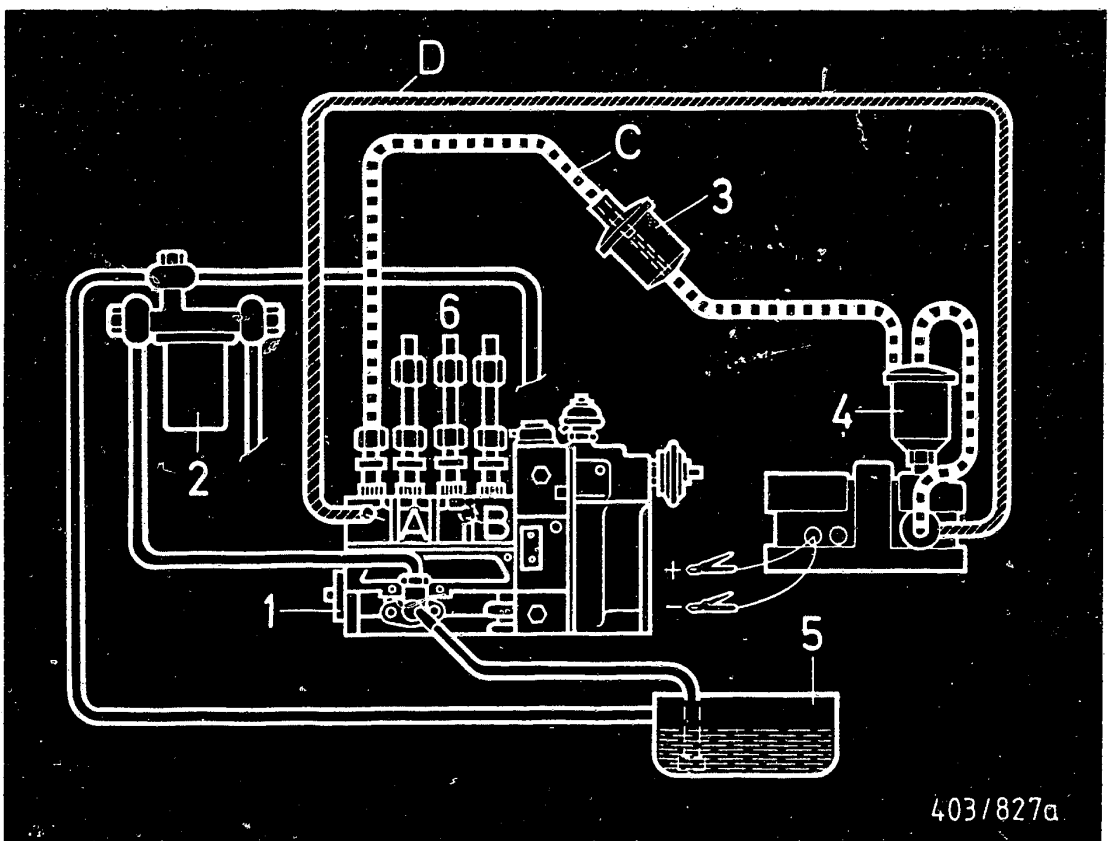
Screw in chain tensioner (see picture, arrow) and tighten to a torque of 80 Nm.

K12

Install fuel injection pump

MB 124/126





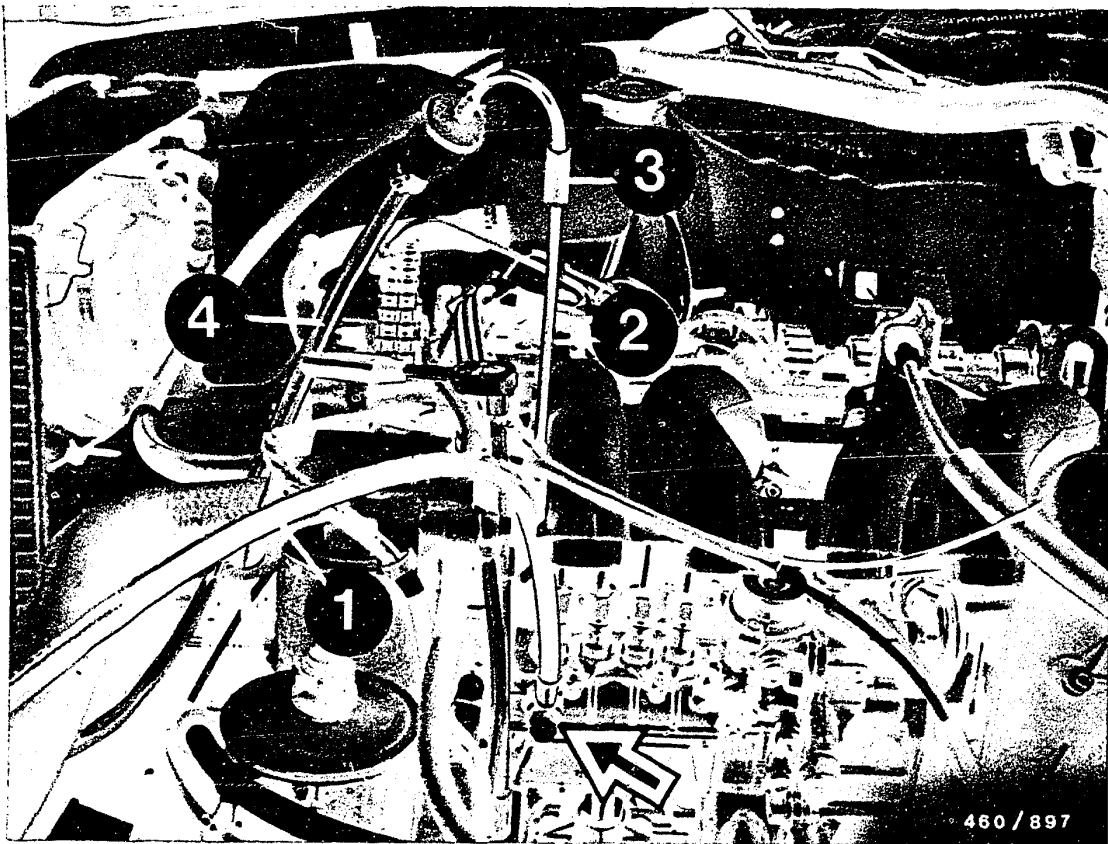
- 1 = Injection pump
- 2 = Fuel filter
- 3 = Sight glass
- 4 = Start-of-delivery setting device
- 5 = Fuel tank
- 6 = Pressure-limiting valves

- A = Inlet-union screw, fuel inlet from start-of-delivery setting device
- B = Seal fuel return line with screw plug.
- C = Return line
- D = High-pressure line approx. 30 + 4 bar

Connection diagram for start-of-delivery adjustment (static)

High pressure - overflow - method.





- 1 = High-pressure hose
- 2 = Test line
- 3 = Pipe bend
- 4 = Return hose

Setting the start of delivery

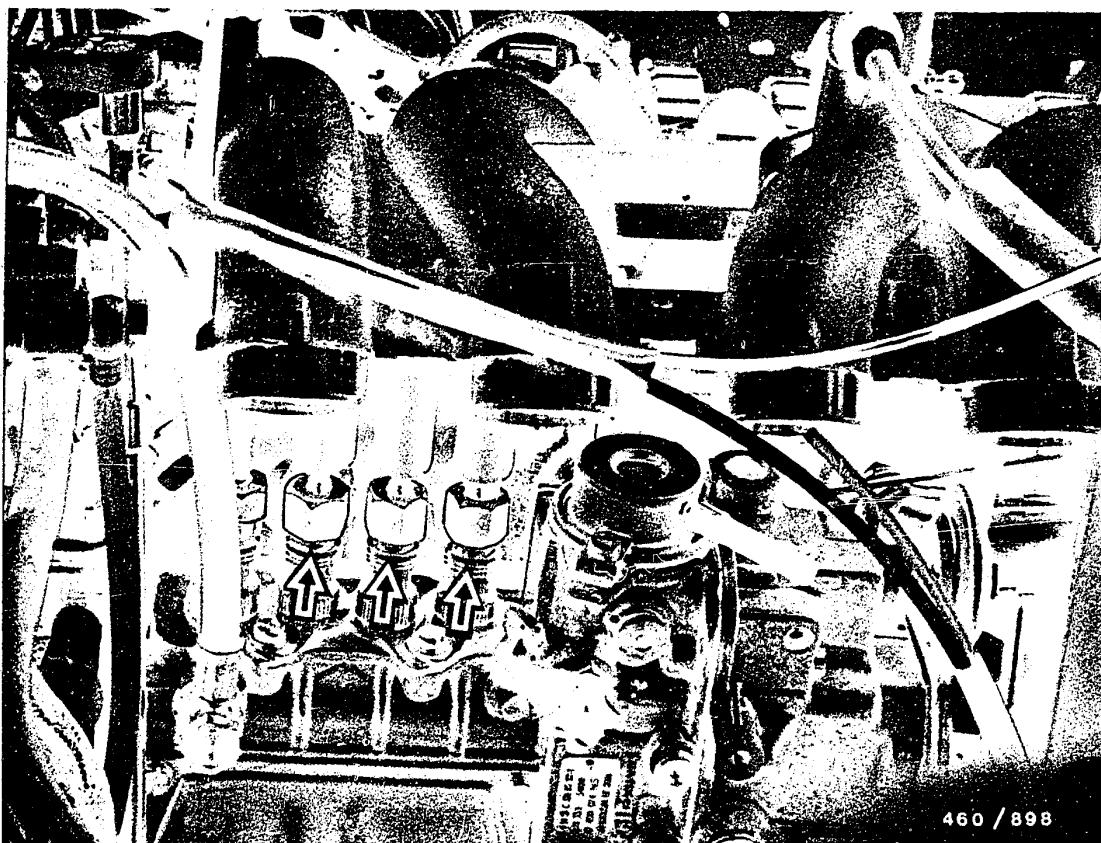
Place start-of-delivery setting device next to vehicle (e.g. on workshop trolley).

Connect high-pressure hose of device to suction chamber inlet of injection pump (see picture, arrow).

Seal return connection of pump by means of screw plug.

Secure test line KDEP-P 200/11 to delivery-valve holder of cyl. 1 (for start-of-delivery setting) and connect pipe bend. Hang return hose into fuel tank of start-of-delivery setting device.





460 / 898

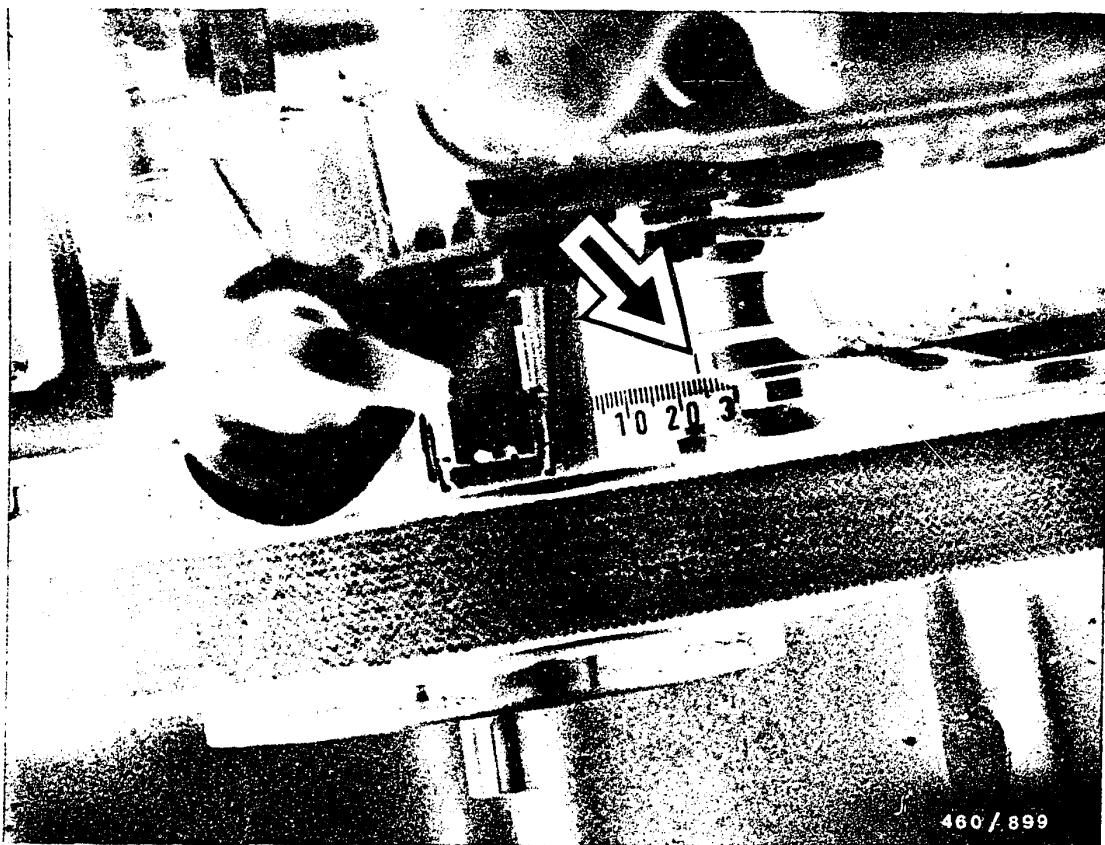
Seal the remaining pump outlets with pressure-limiting valves KDEP-P 200/13 (see picture, arrows). Connect electric leads of start-of-delivery setting device to vehicle battery (12 V) (red cable to +). Fill fuel tank of start-of-delivery setting device with diesel fuel.

K15

Install fuel injection pump

MB 124/126





460 / 899

Turn crankshaft over twice in engine direction of rotation and set to approx. $+35^{\circ}$ BTDC on compression stroke of cylinder 1 (valve overlap on cylinder 4). Press injection-pump control rod to full load. Switch on start-of-delivery setting device.

Note:

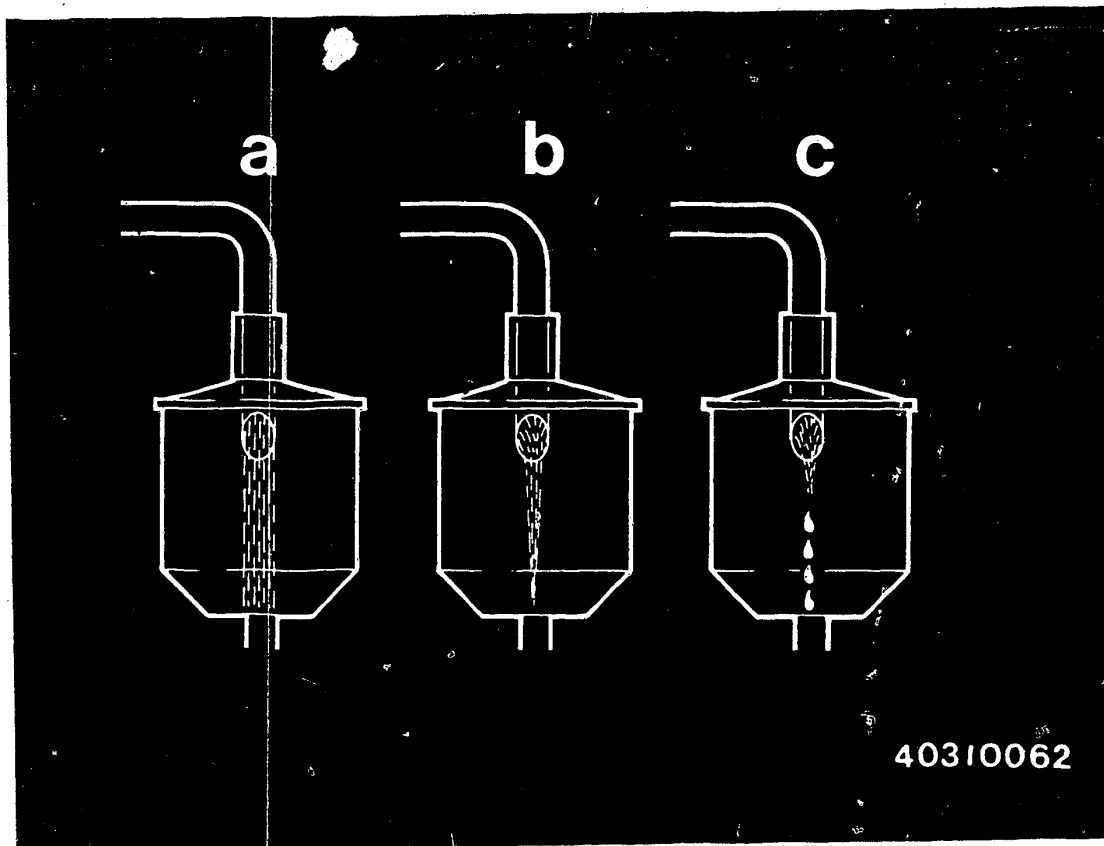
Switch on start-of-delivery setting device only for measuring. If injection nozzles are leaking, it is otherwise possible for fuel to enter the combustion chamber.

K16

Install fuel injection pump

MB 124/126





40310062

- a = Full fuel jet
- b = Tapered fuel jet just before start of delivery
- c = Chain of drips - start of delivery

Slowly continue to turn crankshaft in direction of rotation of engine.

While doing this, observe fuel jet in sight glass.

When the jet turns into a chain of drips, the start of delivery has been reached.

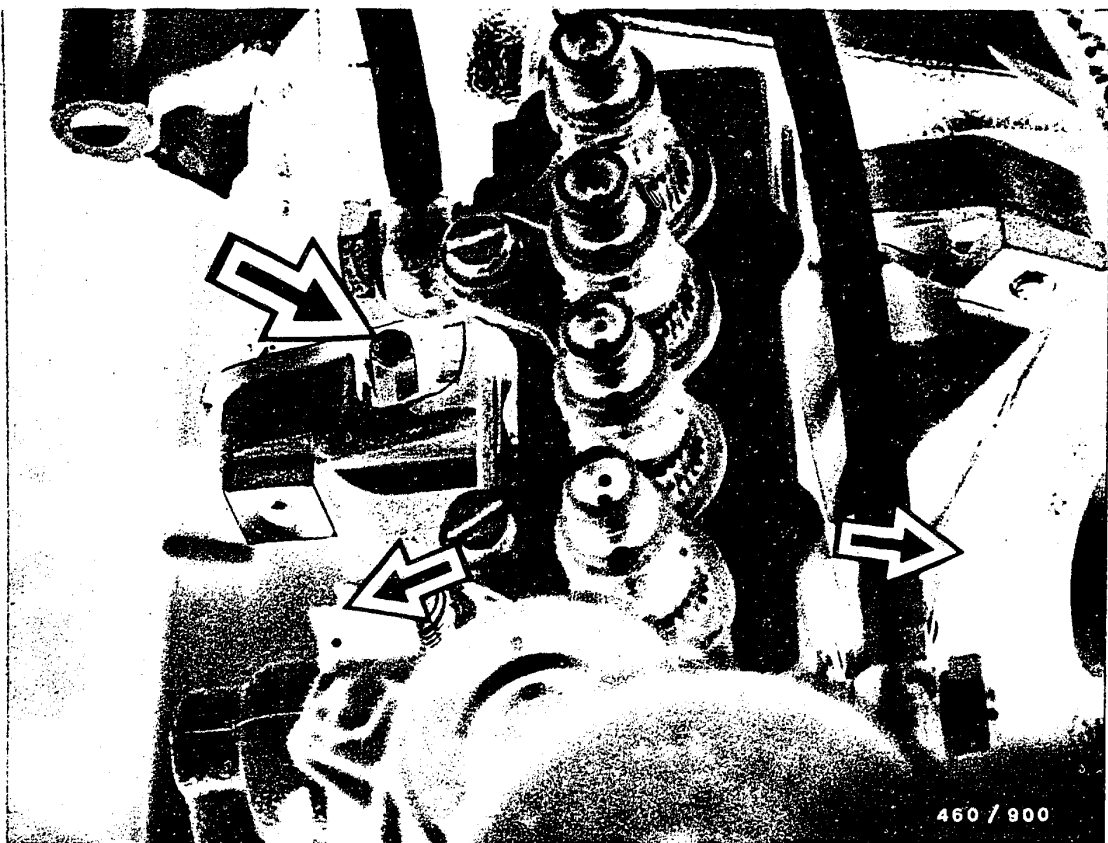
Set value 24° BTDC.

K17

Install fuel injection pump

MB 124/126





If set value is not reached, pivot injection pump by turning the adjusting screw (see picture, arrow).

Turning the adjusting screw to the right = start of delivery comes later

Turning the adjusting screw to the left = start of delivery comes earlier.

If the range of adjustment is not enough, the injection pump must be relocated.

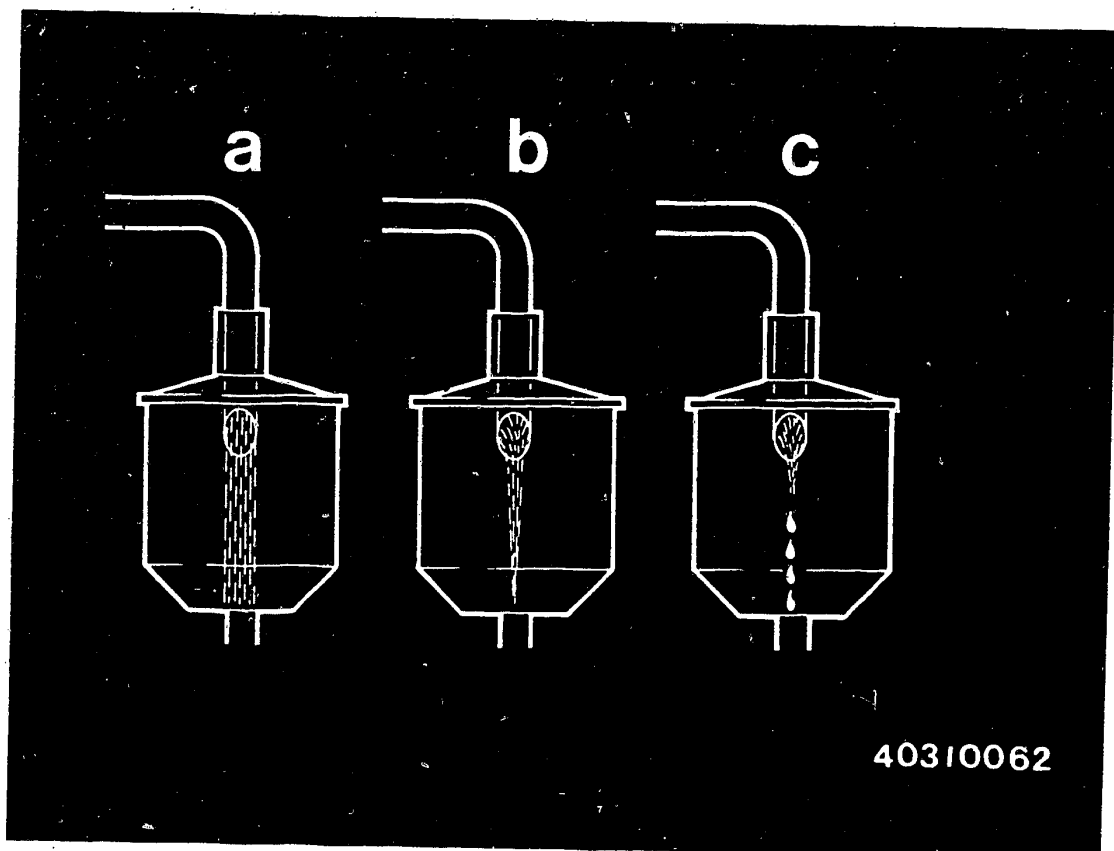
Then test the start of delivery again.

K18

Install fuel injection pump

MB 124/126





40310062

- a = Full fuel jet
- b = Tapered fuel jet just before start of delivery
- c = Chain of drips - start of delivery

Turn engine over in direction of rotation to just before start of delivery (approx. 35° BTDC).

Switch on start-of-delivery setting device. Press injection-pump control rod to full load.

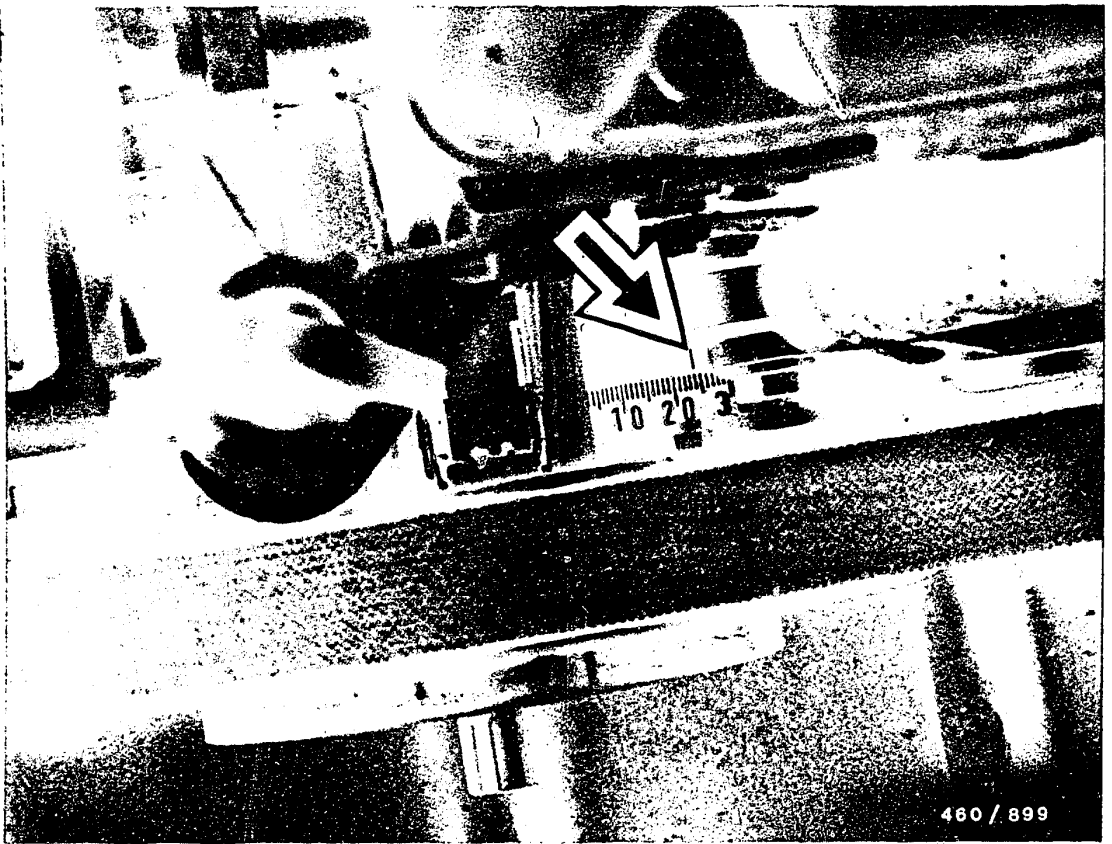
Turn engine further in direction of rotation. While doing this, observe fuel jet in sight glass. The start of delivery has been reached when the fuel jet changes into a chain of drips.

K19

Install fuel injection pump

MB 124/126





460 / 899

In this position the engine marks for start of delivery must align (see picture).

Set value: 24° BTDC

Switch off start-of-delivery setting device and remove accessories.

Remove screw plug from injection-pump return.

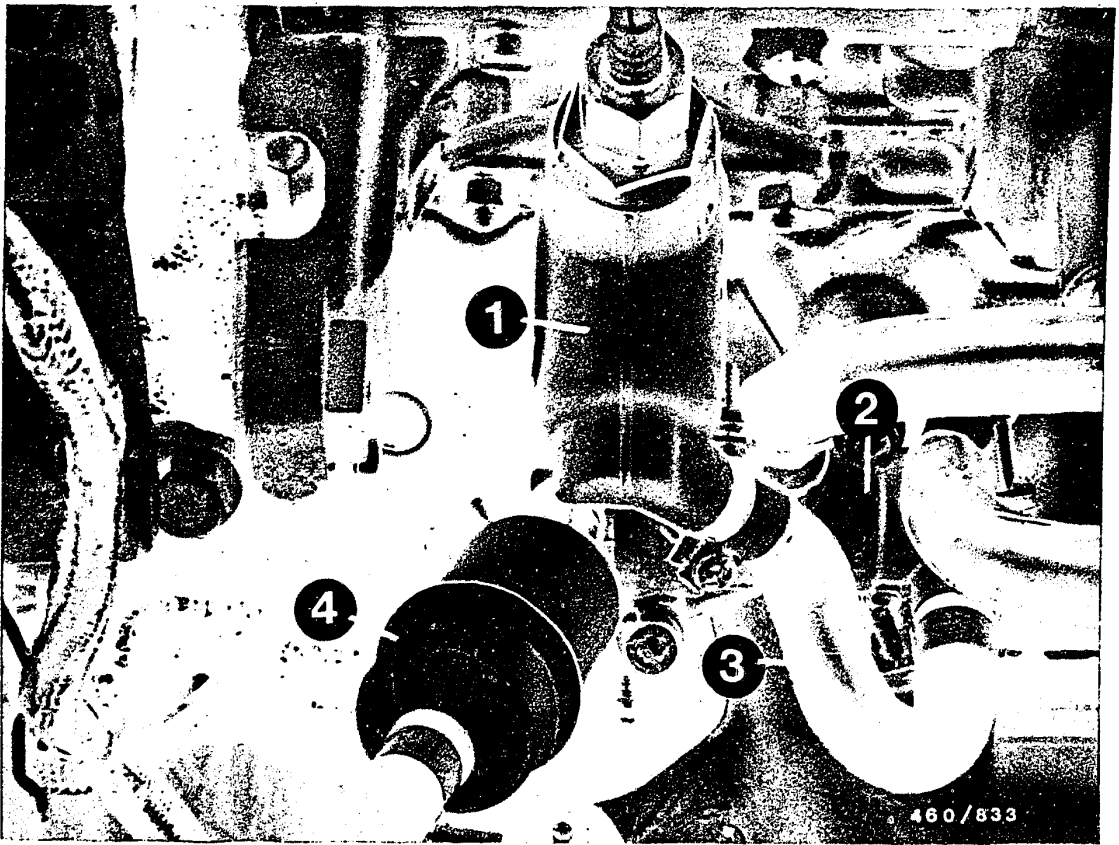
Tighten injection-pump fastening screw (20 - 25 Nm).

K20

Install fuel injection pump

MB 124/126

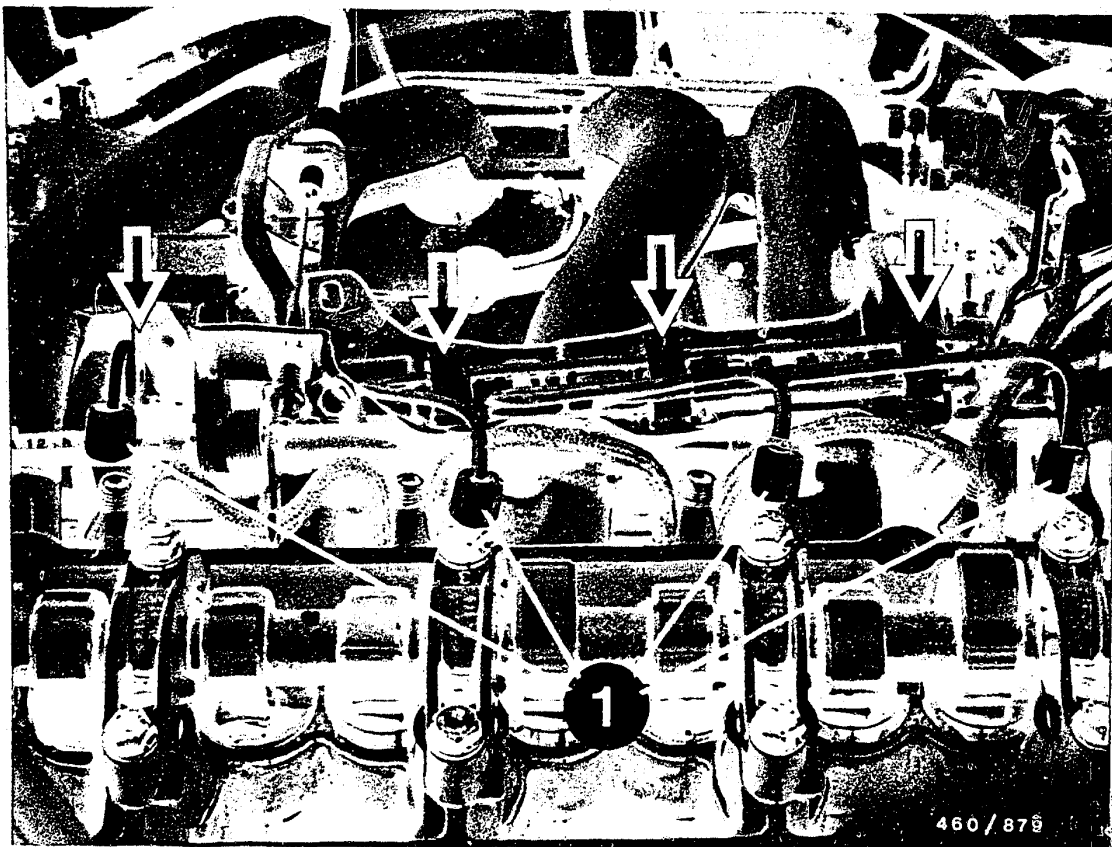




- 1 = Fuel supply pump
- 2 = Fuel thermostat
- 3 = Suction line
- 4 = Fuel prefilter

Mount fuel thermostat.
Mount suction line on fuel supply pump.

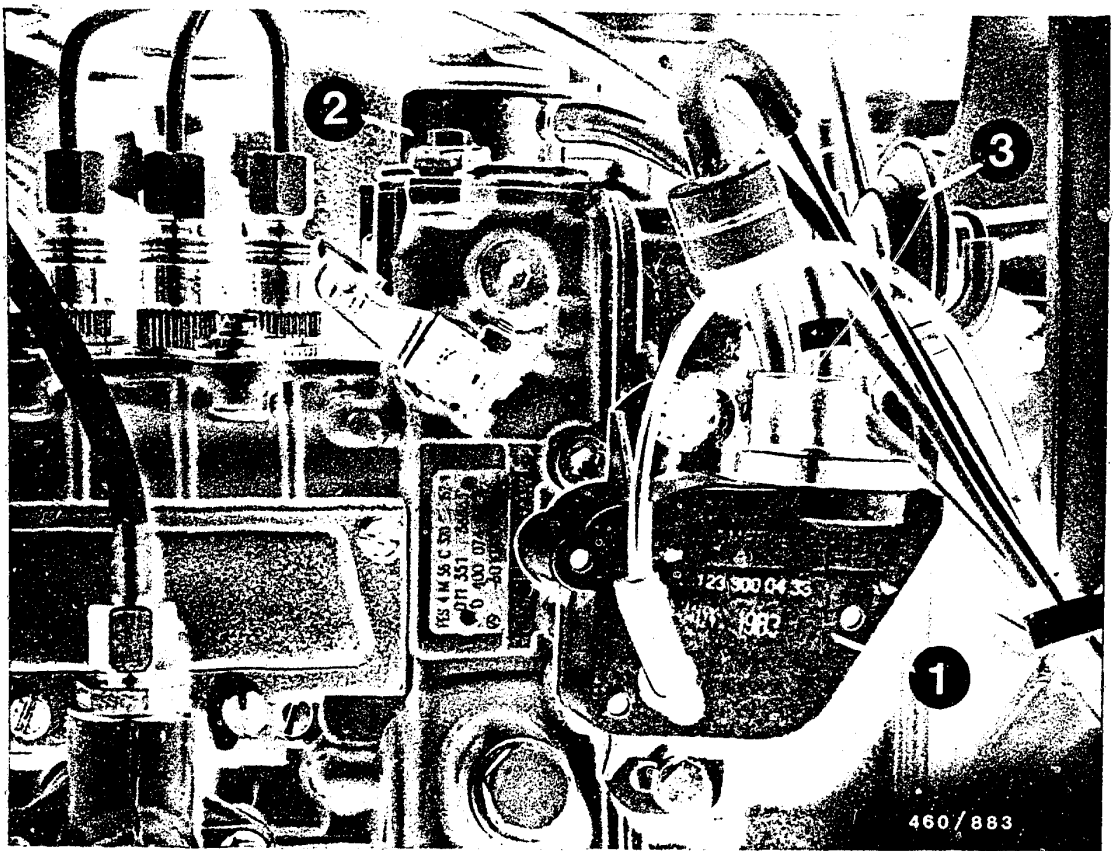




1 = Injection lines

Mount injection lines on nozzle-holder assemblies.
Mount fastening screws and fuel clip (see picture,
arrows).

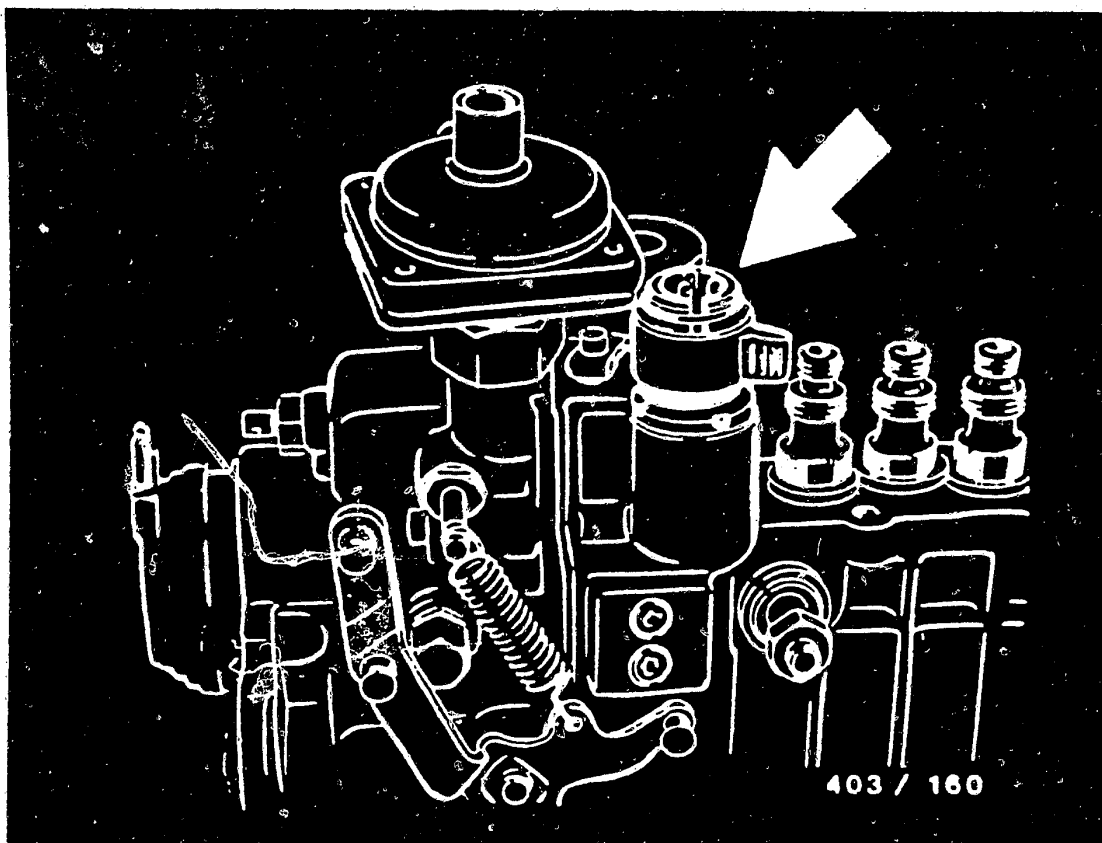




- 1 = Vacuum unit
- 2 = Shutoff box
- 3 = Vacuum control valve

Mount vacuum lines on vacuum unit for idle increase, on shutoff box and, on vehicles with automatic transmission, on vacuum control valve.





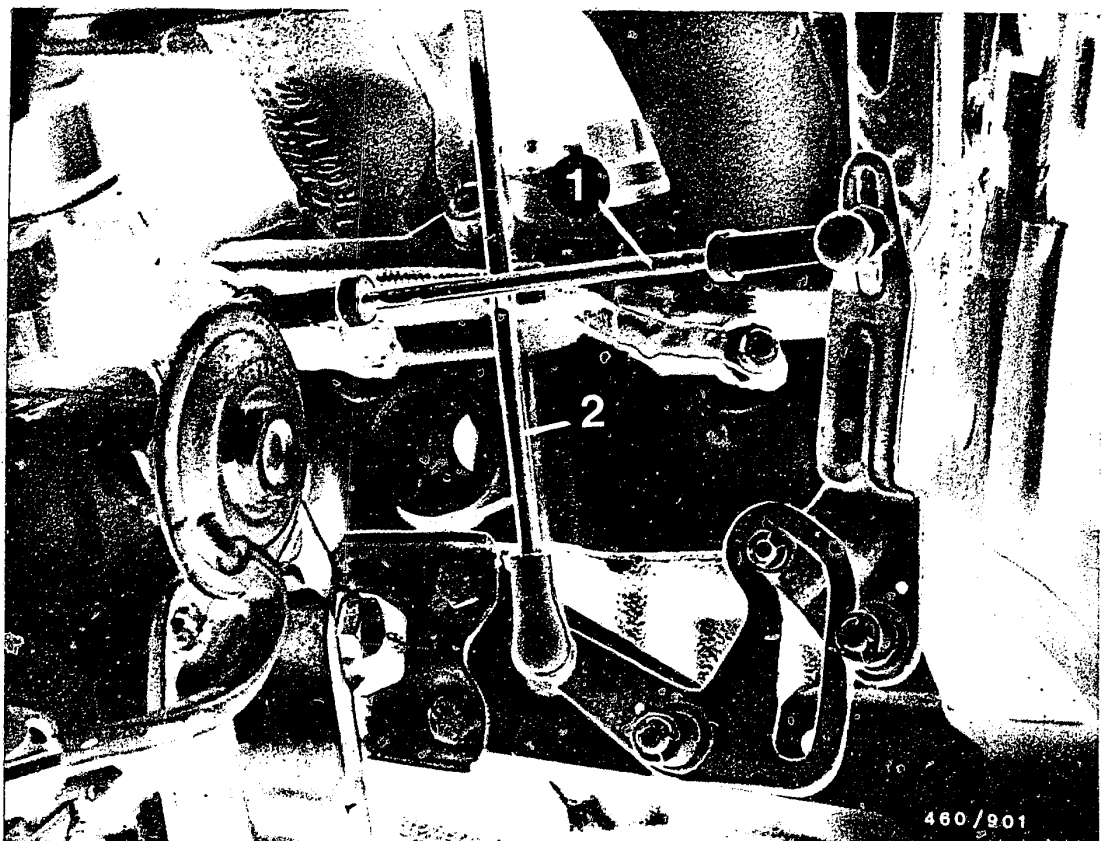
Fit control-rod-travel-sensor connecting lead.
Turn mounting (arrow).

L1

Install fuel injection pump

MB 124/126





- 1 = Connecting rod to injection pump
- 2 = Connecting rod to regulating lever
- type 124

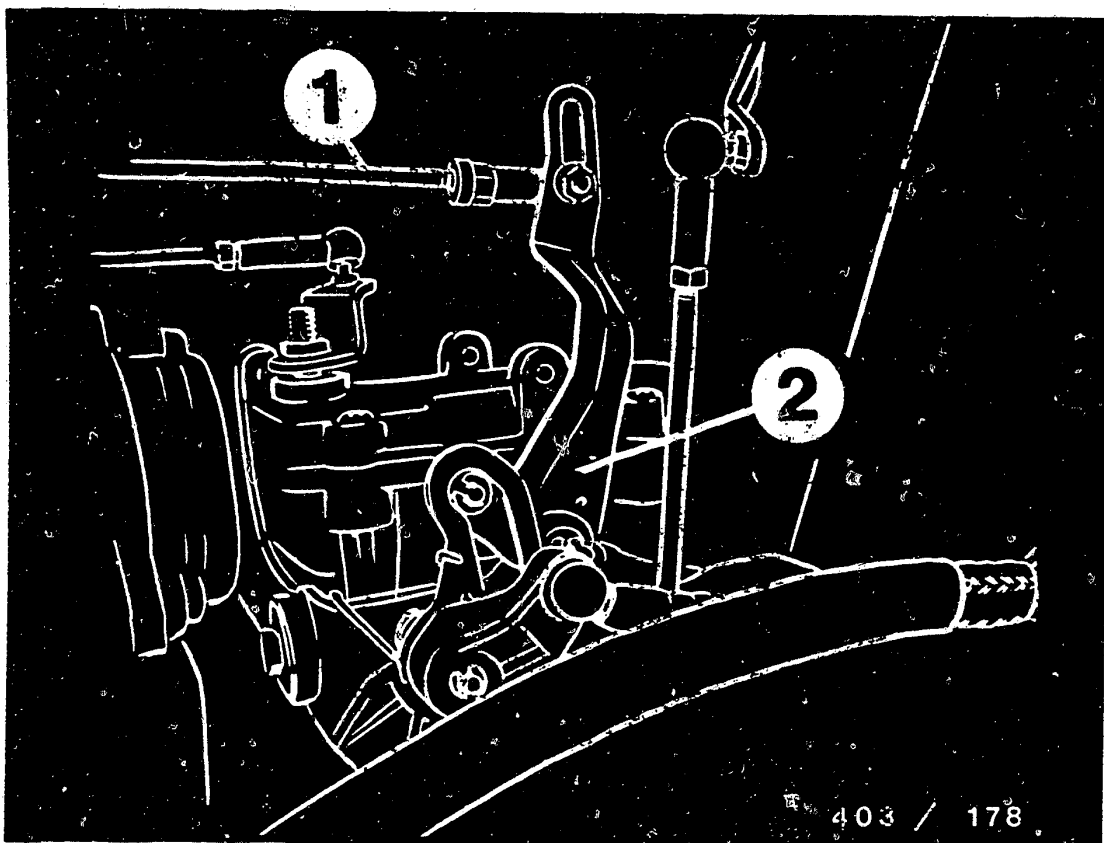
Hook connecting rod into injection-pump control lever.
Hook connecting rod into regulating lever.

L2

Install fuel injection pump

MB 124/126





- 1 = Connecting rod to injection pump
2 = Connecting rod to regulating lever
- type 126

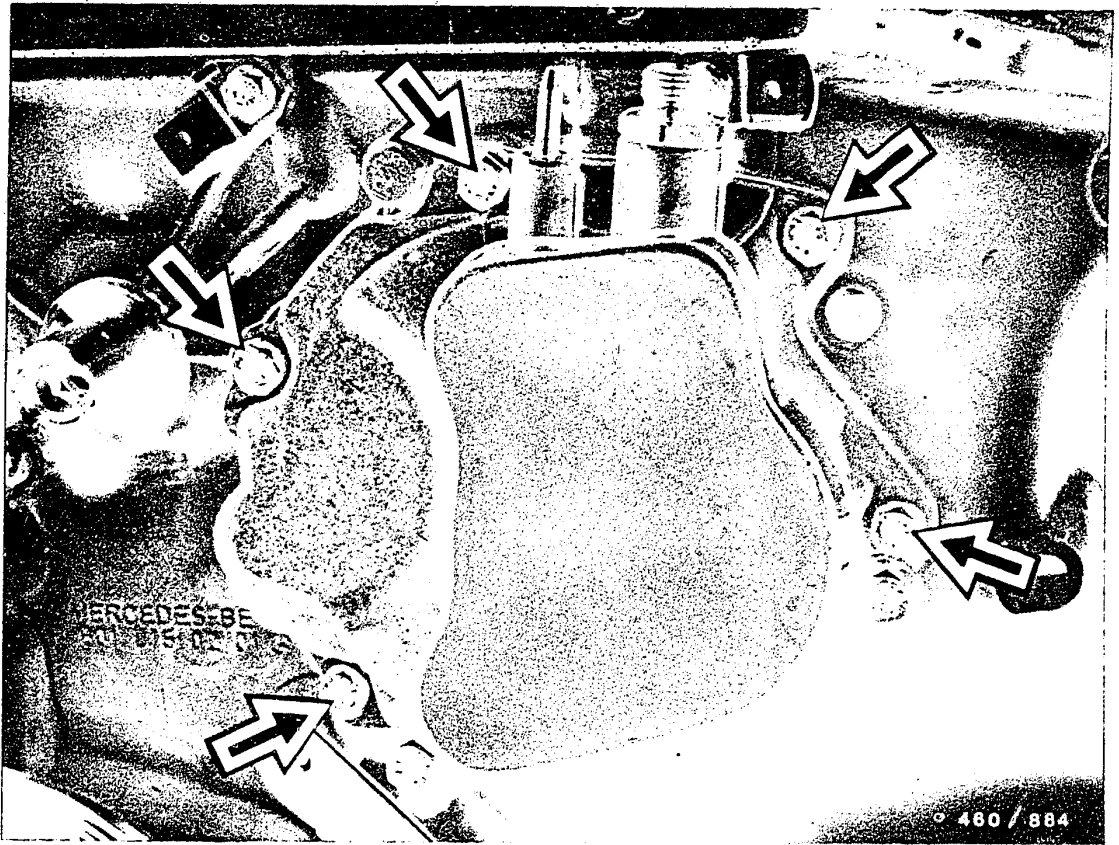
Hook connecting rod into injection-pump control lever.
Hook connecting rod into regulating lever.

L3

Install fuel injection pump

MB 124/126





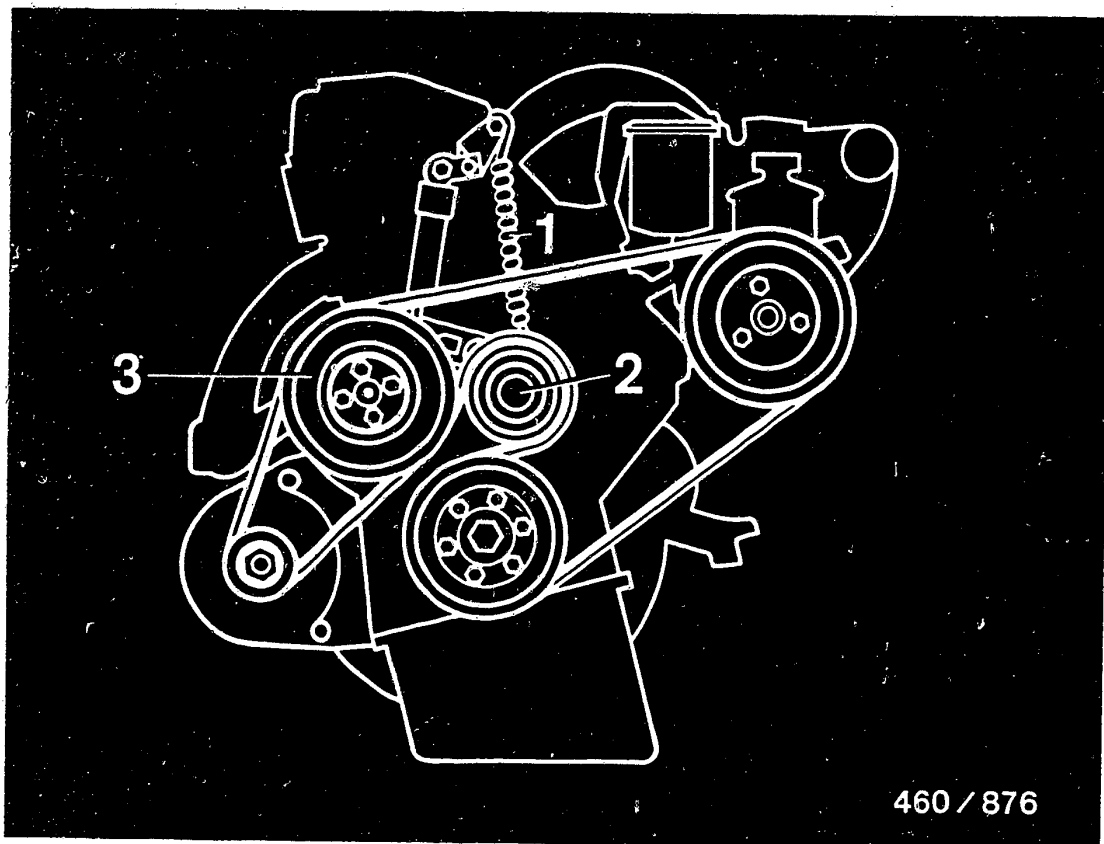
Mount vacuum pump.
Tighten fastening screw (see illustration, arrows).

L4

Install fuel injection pump

MB 124/126





460 / 876

- 1 = Extension spring
- 2 = Tensioning roller
- 3 = Coolant pump

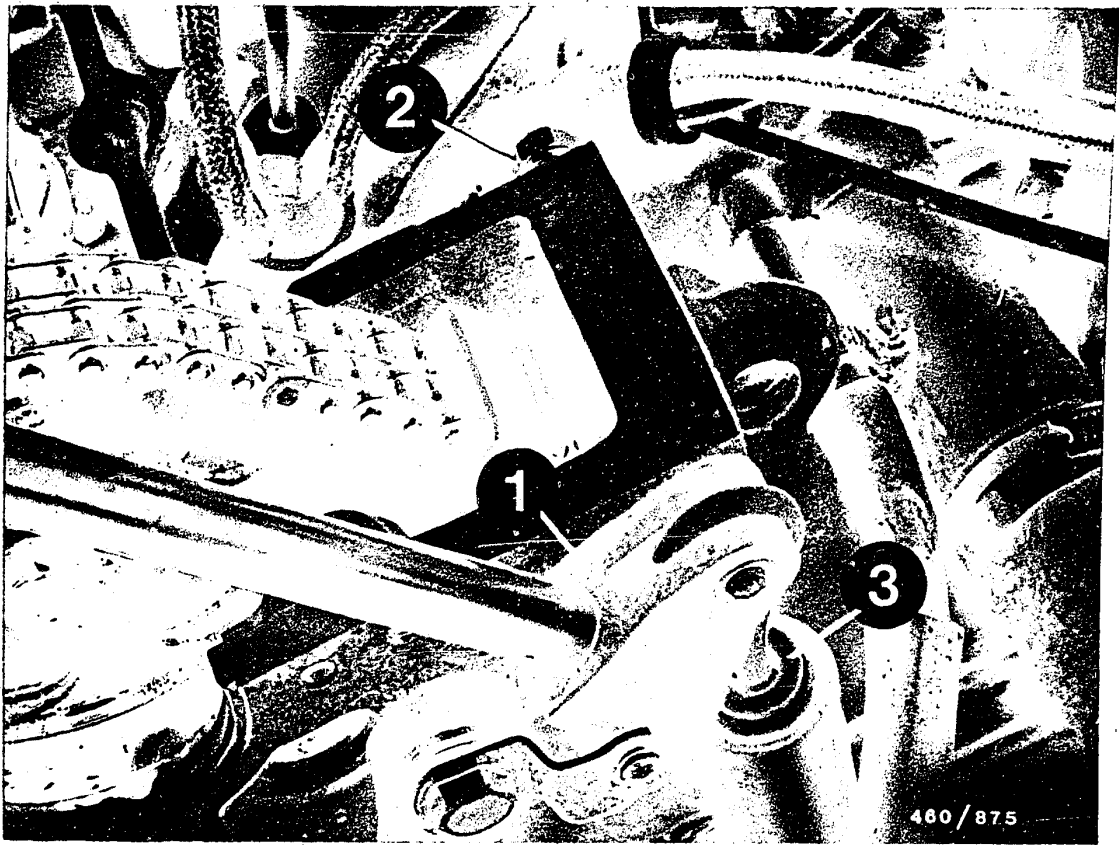
Place on ribbed V-belt.
Start at tensioning roller and finish at coolant pump.
Hook extension spring into tensioning roller.
Mount cylinder head cover.

L5

Install fuel injection pump

MB 124/126



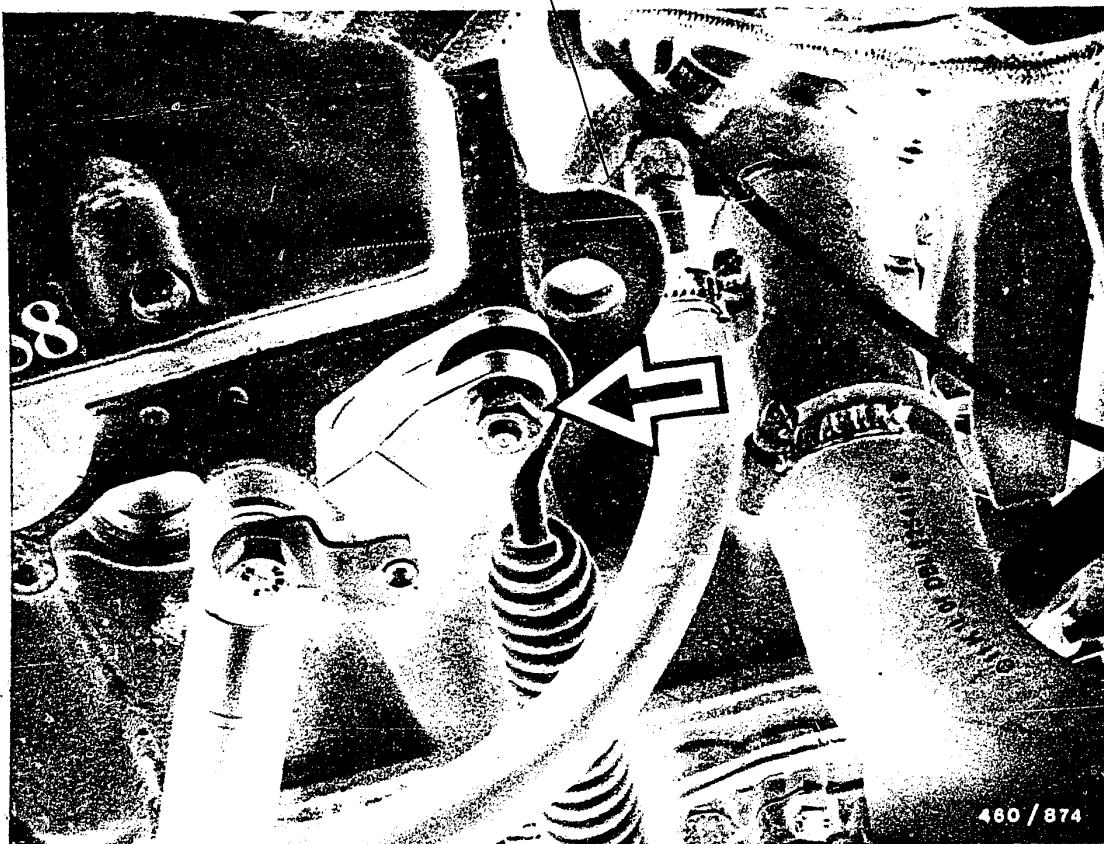


- 1 = Spring tensioning lever
- 2 = Fastening screw
- 3 = Extension spring

Tension extension spring. To do this, fit lever or mandrel (12 - 13 mm \varnothing , approx. 300 mm long) into bore on spring tensioning lever.

Press lever to the left and slide fastening screw through spring tensioning lever.





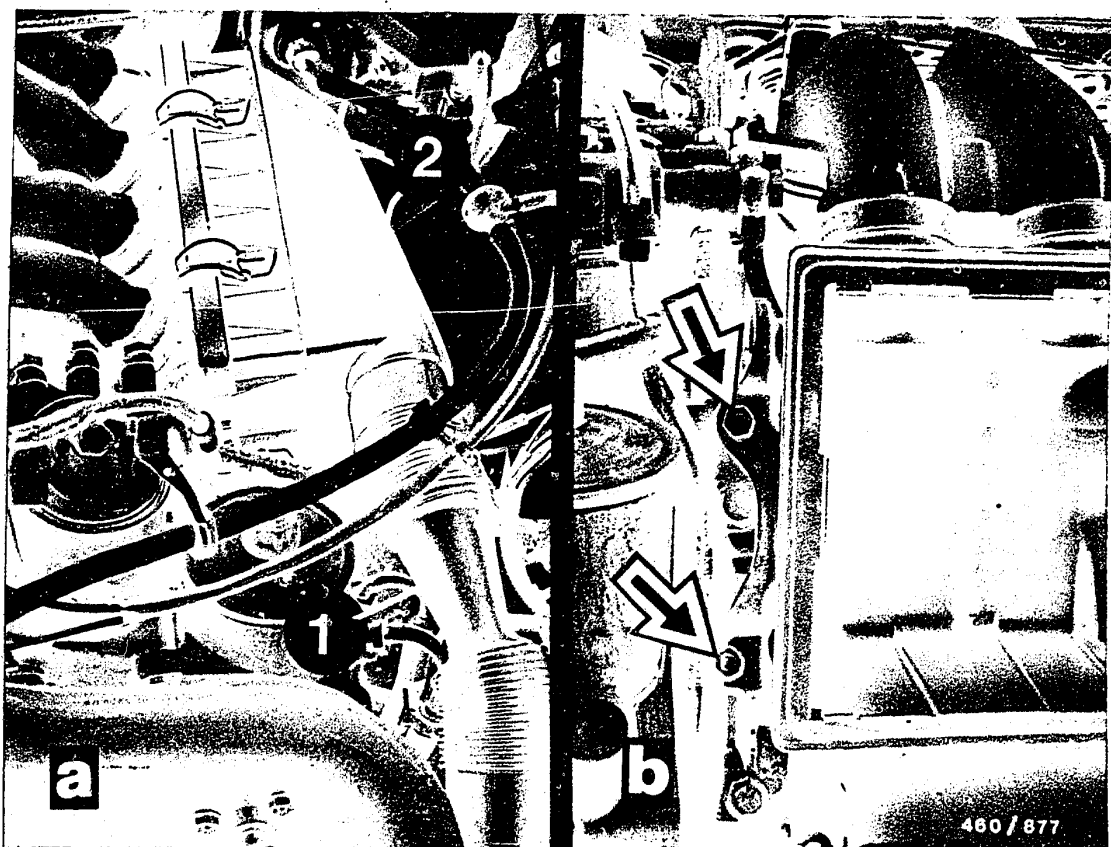
Tighten belt tensioner fastening nut (see picture, arrow).

L7

Install fuel injection pump

MB 124/126





1 = Air-intake dome
2 = Air filter cover

Mount side holders for air guide housing (see picture b, arrows).

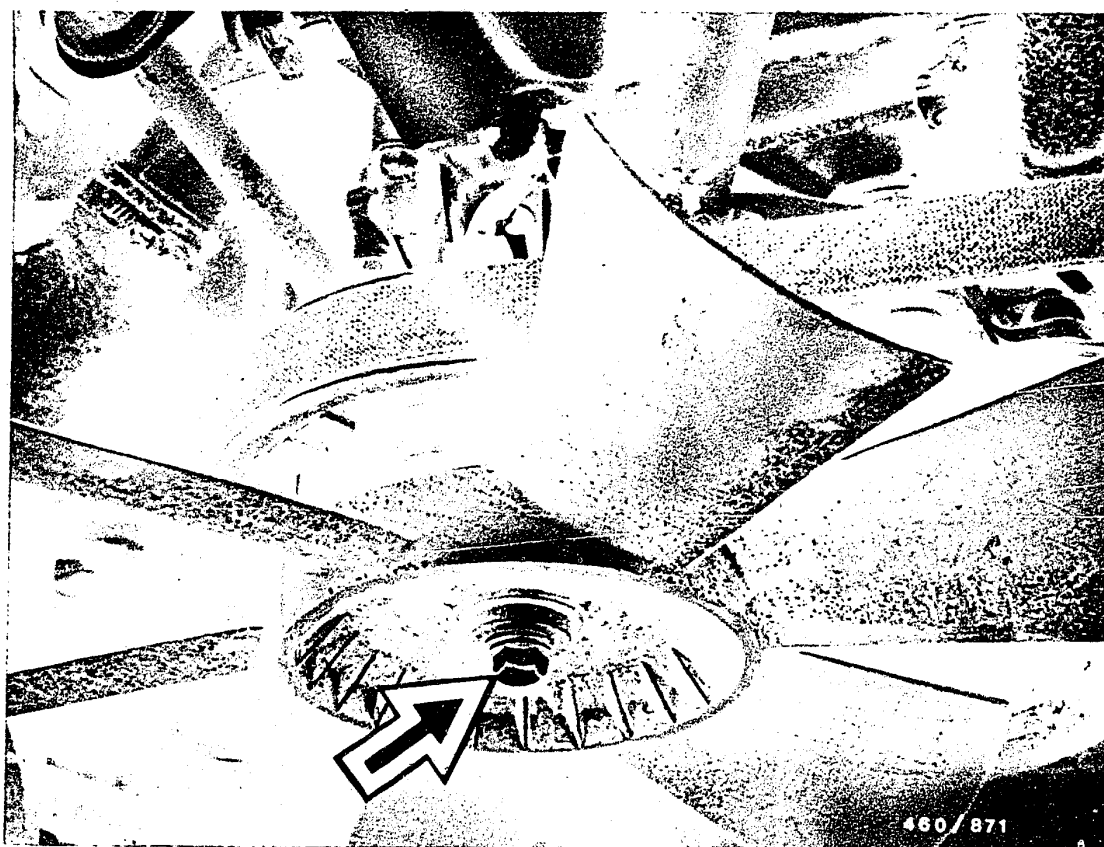
Mount air filter cover and slide on air-intake dome.

L8

Install fuel injection pump

MB 124/126





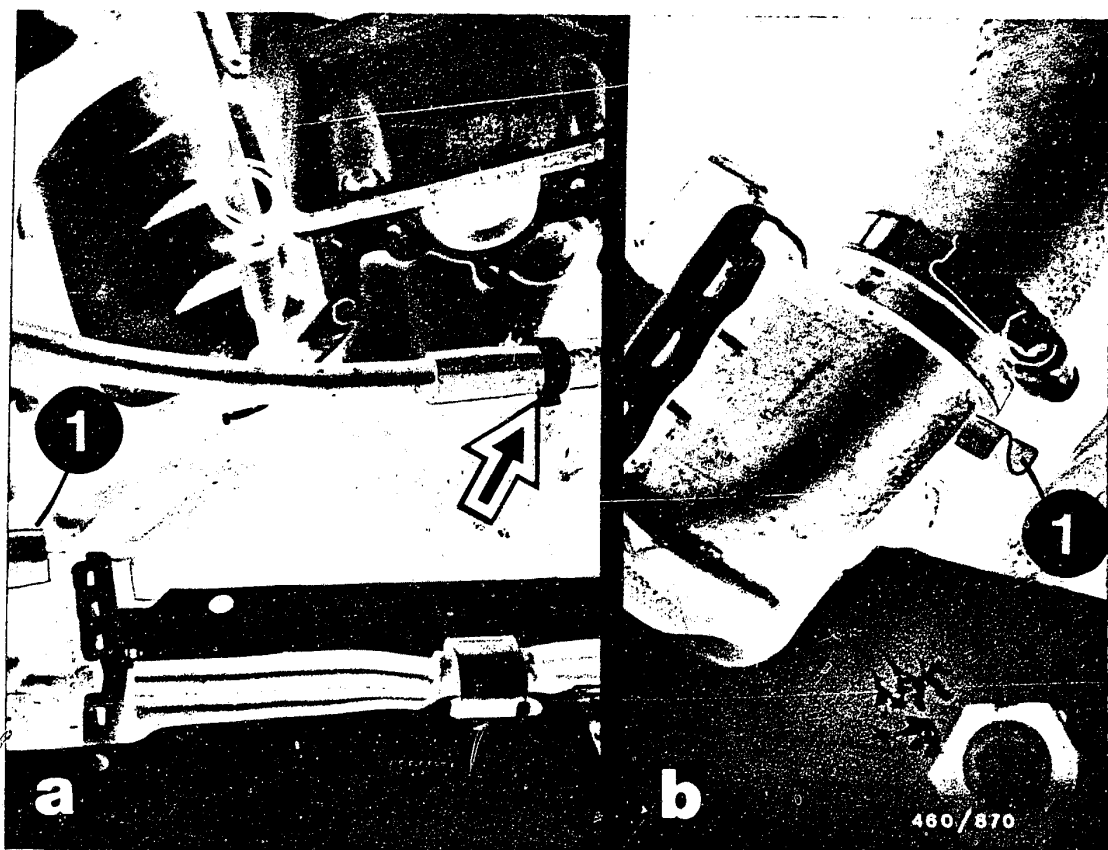
Mount fan and fan cover on radiator.
Tighten fan fastening screw (see picture, arrow).

L9

Install fuel injection pump

MB 124/126





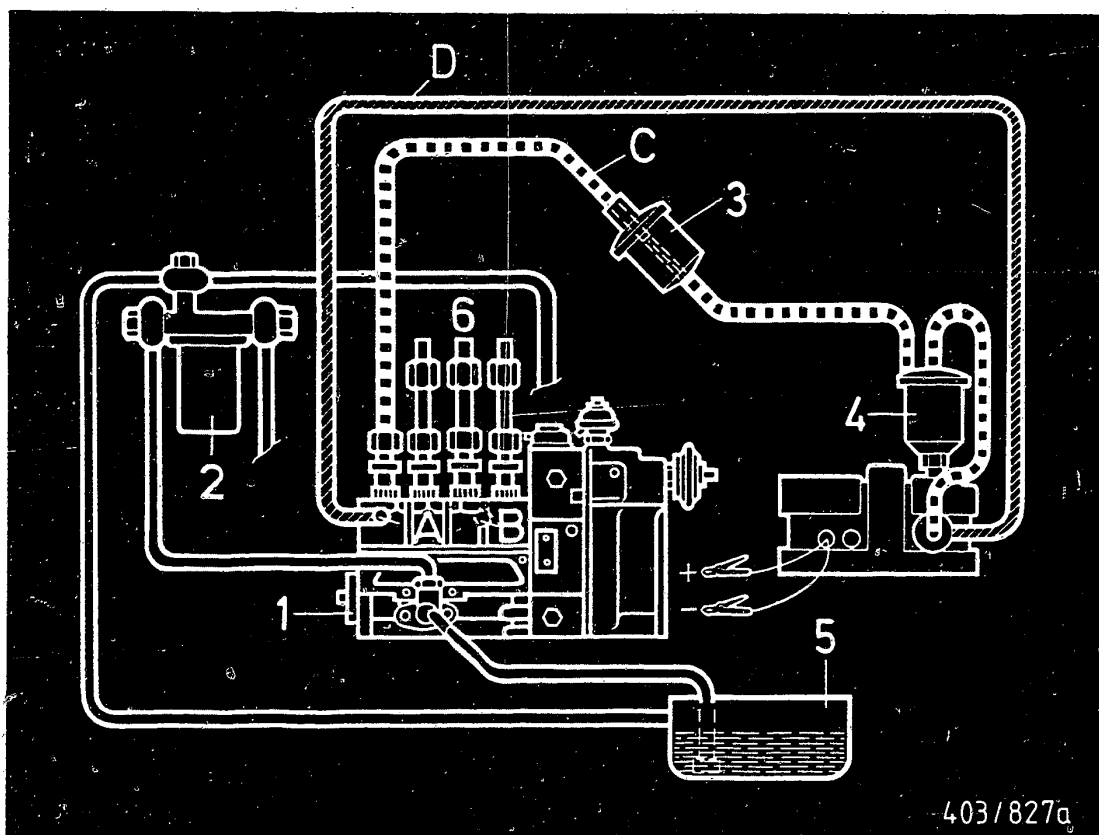
1 = Fan shrouds

Mount fan shrouds (pictures a and b) and hose binder (arrow, picture a).

Connect negative cable to battery.

Mount front noise capsule.





- 1 = Injection pump
- 2 = Fuel filter
- 3 = Sight glass
- 4 = Start-of-delivery setting device
- 5 = Fuel tank
- 6 = Pressure-limiting valves

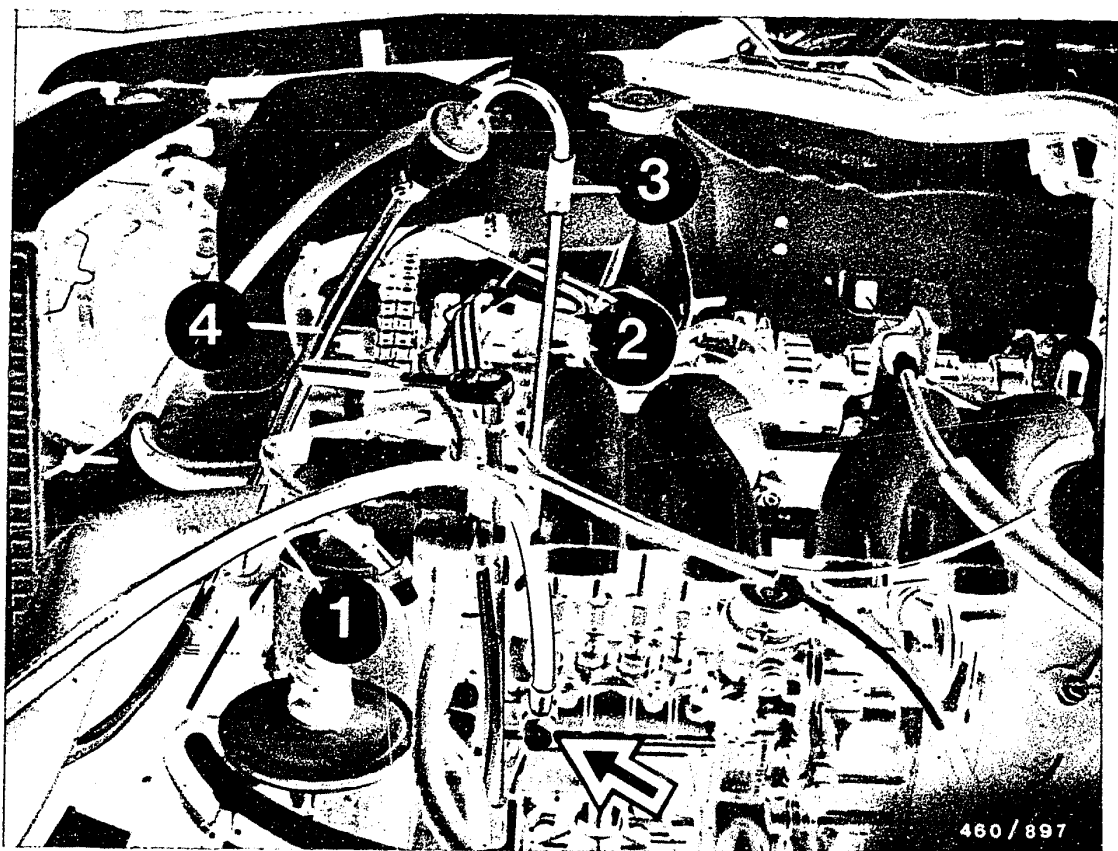
- A = Inlet-union screw, fuel inlet from start-of-delivery setting device
- B = Seal fuel return line with screw plug.
- C = Return line
- D = High-pressure line approx. 30 + 4 bar

33. COORDINATION, INJECTION PUMP - ENGINE (INJ. TIMING)

33.1 Connection diagram for start-of-delivery adjustment (static).

High pressure - overflow - method





- 1 = High-pressure hose
- 2 = Test line
- 3 = Pipe bend
- 4 = Return hose

Remove complete air filter housing. Disconnect vacuum line from shutoff box.

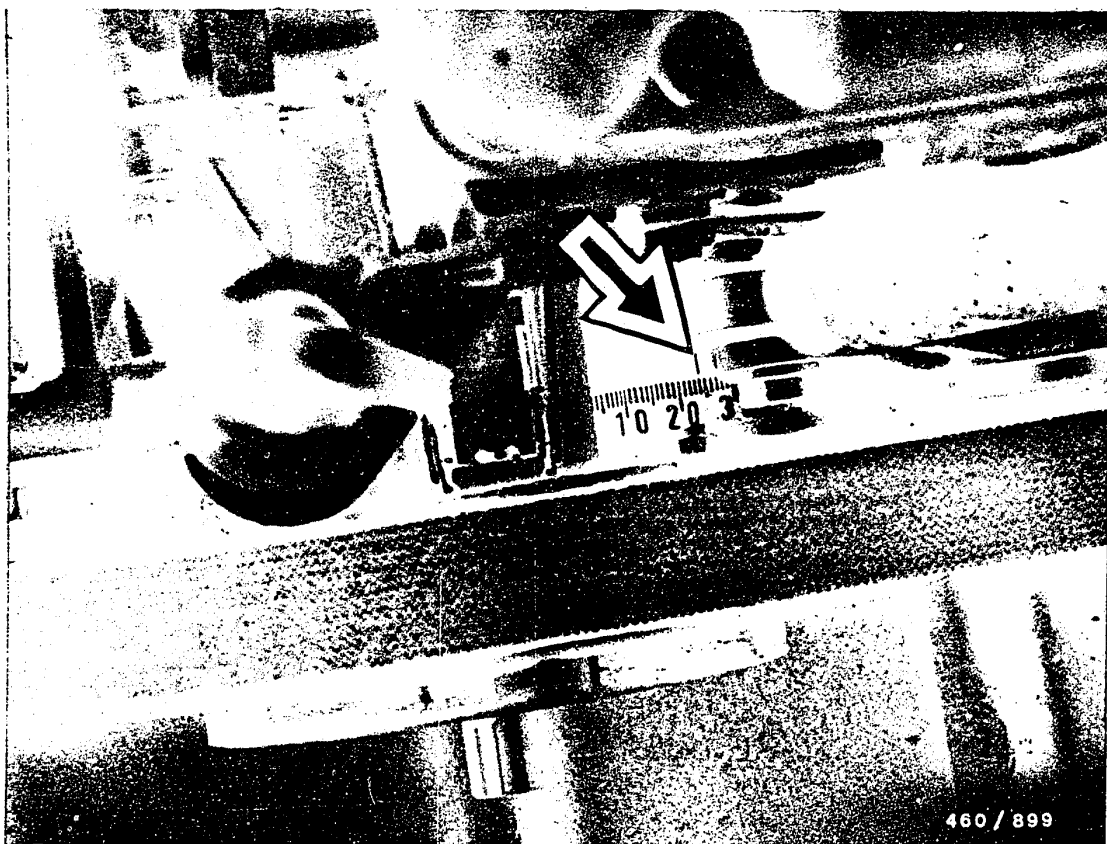
Place start-of-delivery setting device next to vehicle (e.g. on workshop trolley).

Connect high-pressure hose of device to suction chamber inlet of injection pump (see picture, arrow).

Seal return connection of pump by means of screw plug.

Secure test line KDEP-P 200/11 to delivery-valve holder of cyl. 1 (for start-of-delivery setting) and connect pipe bend. Hang return hose into fuel tank of start-of-delivery setting device.





460 / 899

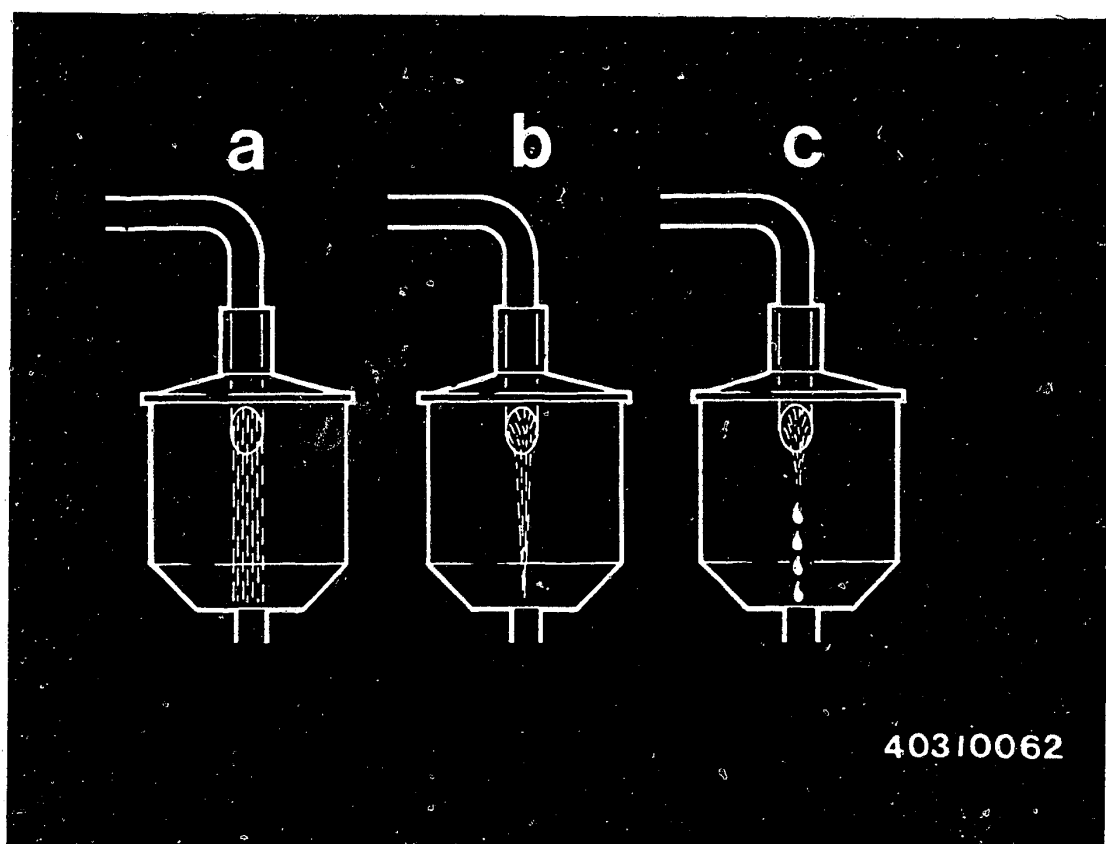
Connect electric leads of start-of-delivery setting device to vehicle battery (12 V) (red cable to battery +). Fill fuel tank of device with diesel fuel. Turn crankshaft over twice in engine direction of rotation and set to approx. 35° BTDC on compression stroke of cylinder 1 (valve overlap on cylinder 4). Press injection-pump control rod to full load. Switch on start-of-delivery setting device.

L13

Coord., inj. pump - eng. (inj. timing)

MB 124/126



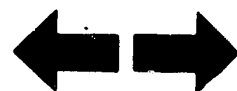


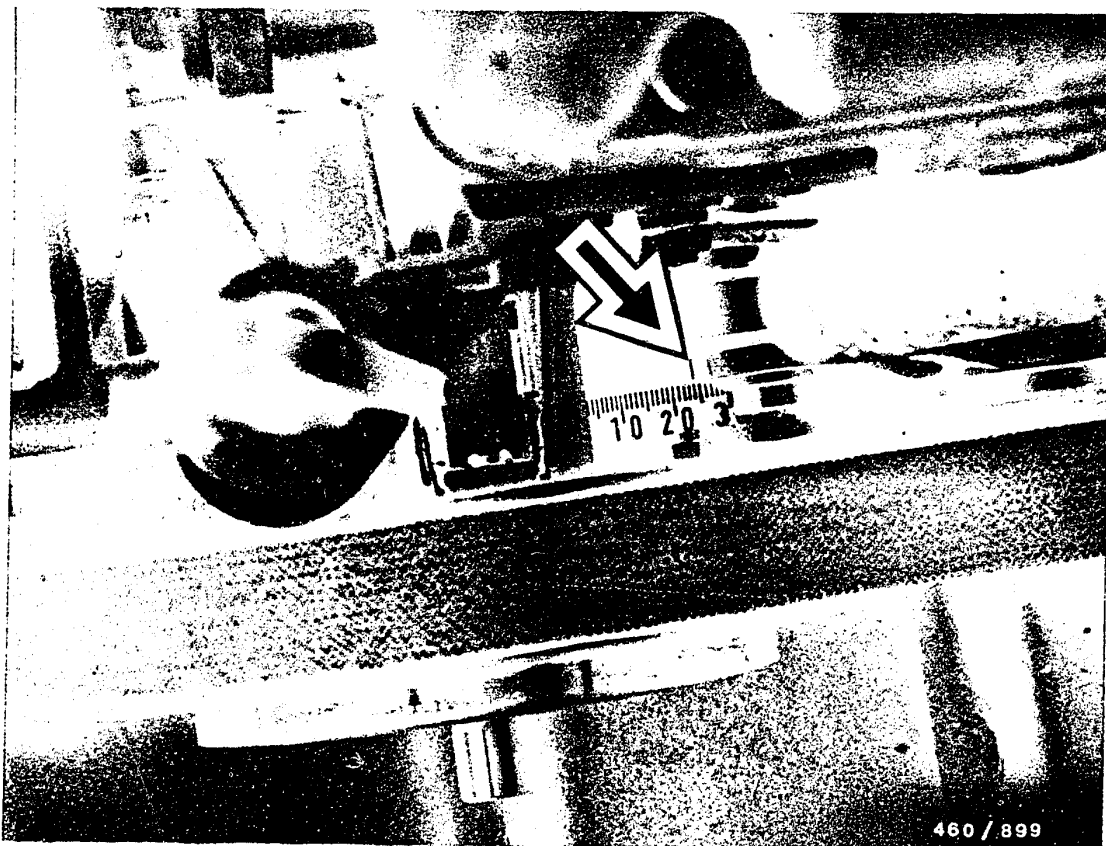
40310062

- a = Full fuel jet
- b = Tapered fuel jet just before start of delivery
- c = Chain of drips - start of delivery

Note: Switch on start-of-delivery setting device only for measuring. If injection nozzles are leaking, it is otherwise possible for fuel to enter the combustion chamber.

Slowly turn engine further in direction of rotation. While doing this, observe fuel jet in sight glass. The start of delivery has been reached when the fuel jet changes into a chain of drips.





460 / 899

In this position the engine marks for the start of delivery must align (see picture).

Set value 24° before TDC.

If set value not reached, a correction is necessary.

Adjusting:

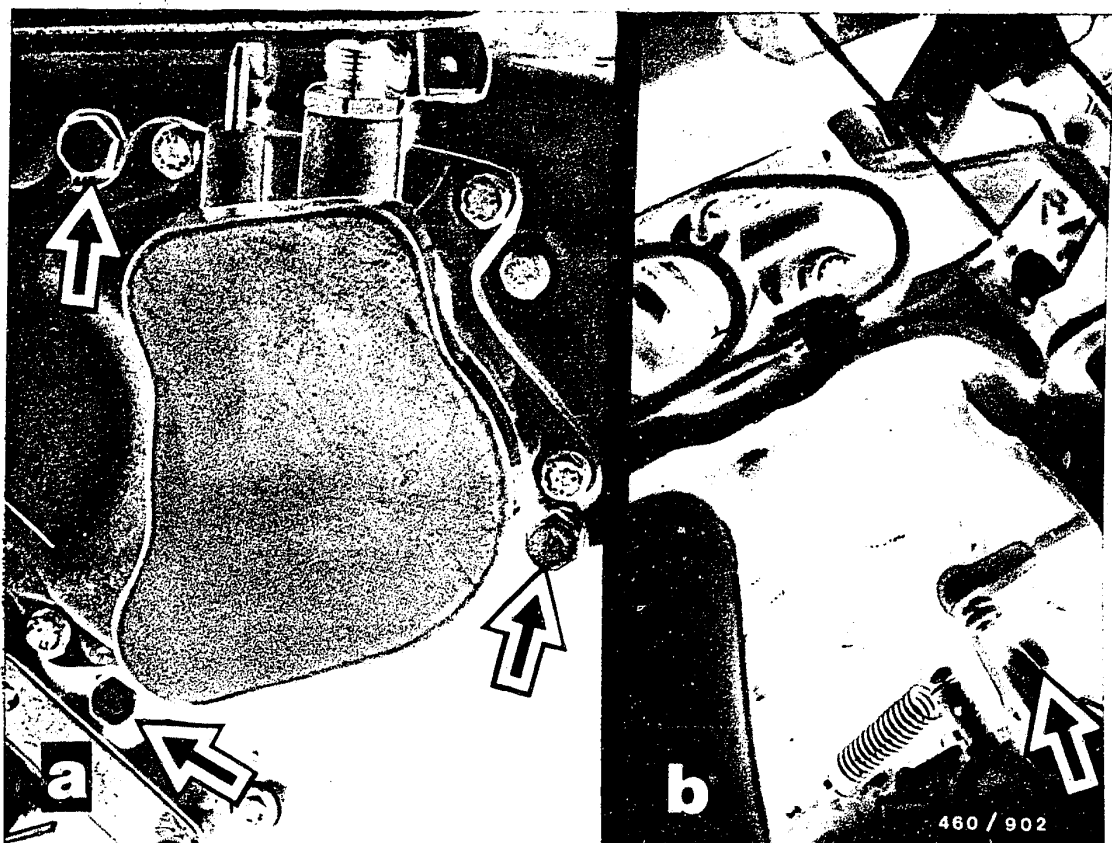
Turn engine over 2 full times in direction of rotation and set to start-of-delivery mark 24° BTDC on compression stroke of cylinder 1 (cylinder 4 on overlap) (see picture, arrow).

L15

Coord., inj. pump - eng. (inj. timing)

MB 124/126

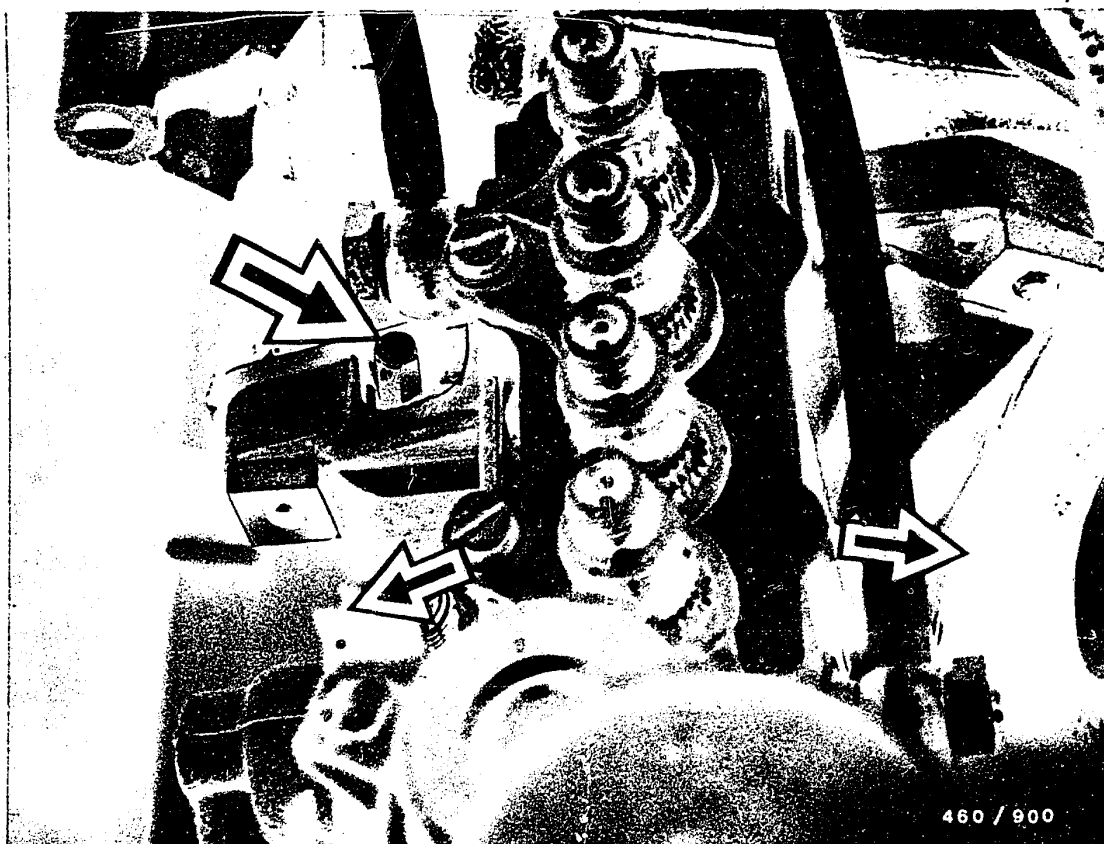




Loosen injection-pump fastening screws at drive end (arrows, picture a) and on support bracket (arrow, picture b).

Press injection-pump control rod to full load.
Switch on start-of-delivery setting device.





Pivot injection pump by turning the adjusting screw (see picture, arrow) until the fuel jet in the sight glass changes into a chain of drips.

Turning the adjusting screw to the right = start of delivery comes later

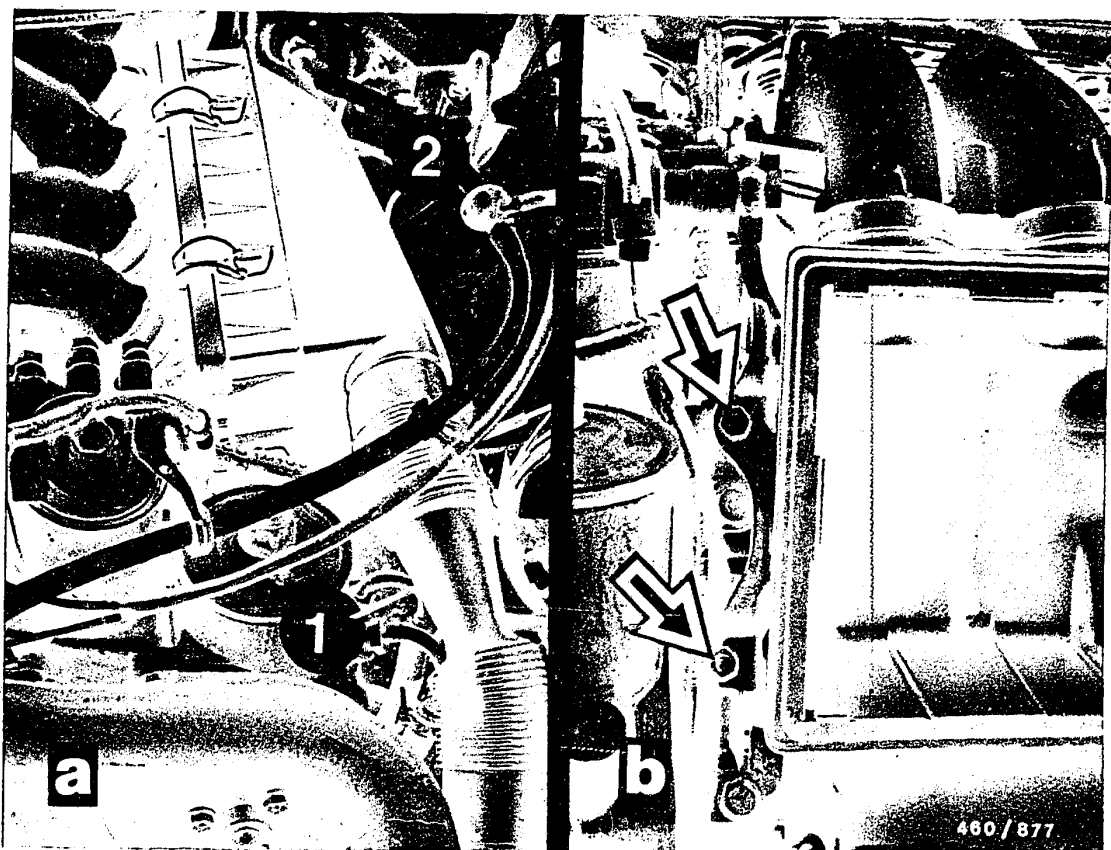
Turning the adjusting screw to the left = start of delivery comes earlier.

If the range of adjustment is not enough, the injection pump must be relocated.

Then repeat test of start of delivery.

Switch off start-of-delivery setting device and remove accessories. Tighten injection-pump fastening screws (20...25 Nm). Remove screw plug from injection-pump return. Connect return line. Mount injection line on cylinder 1.





- 1 = Air intake dome
2 = Air filter cover

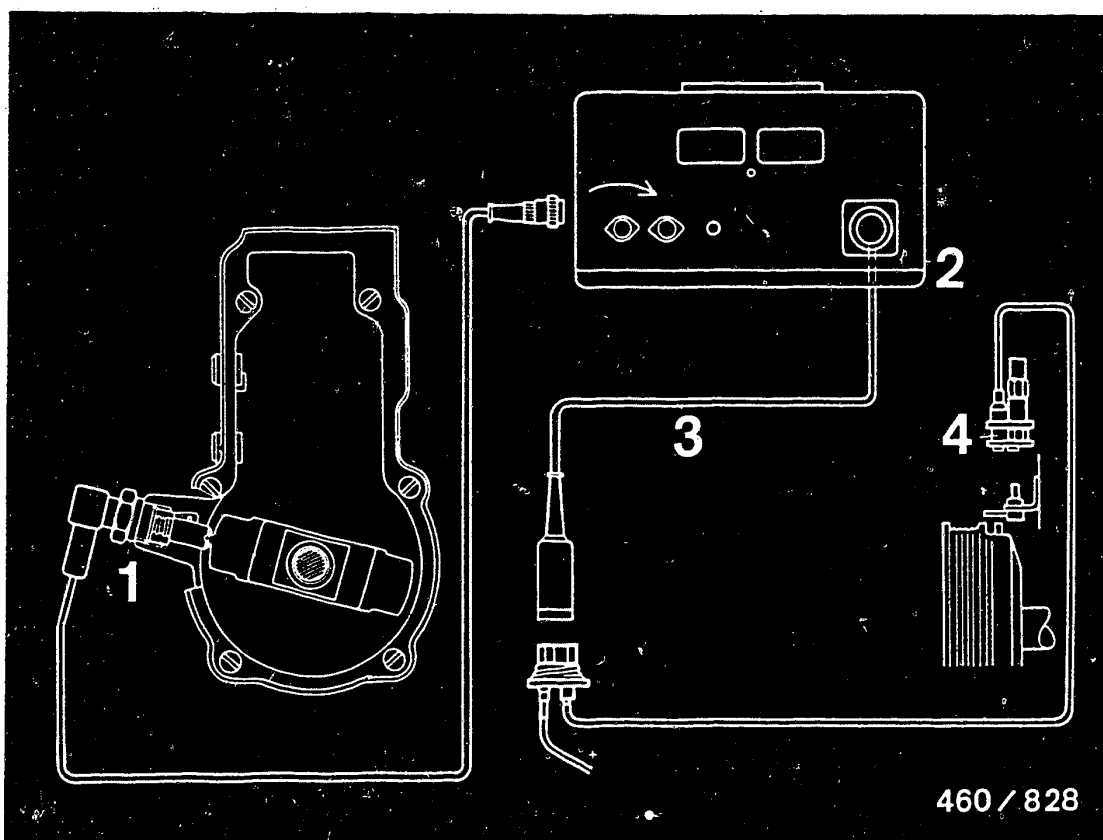
Mount air guide housing (see picture b)
Mount air filter cover and slide on air intake dome.

Note:

The injection system bleeds itself automatically when the engine is started.

Let engine run and test all connections for leaks.



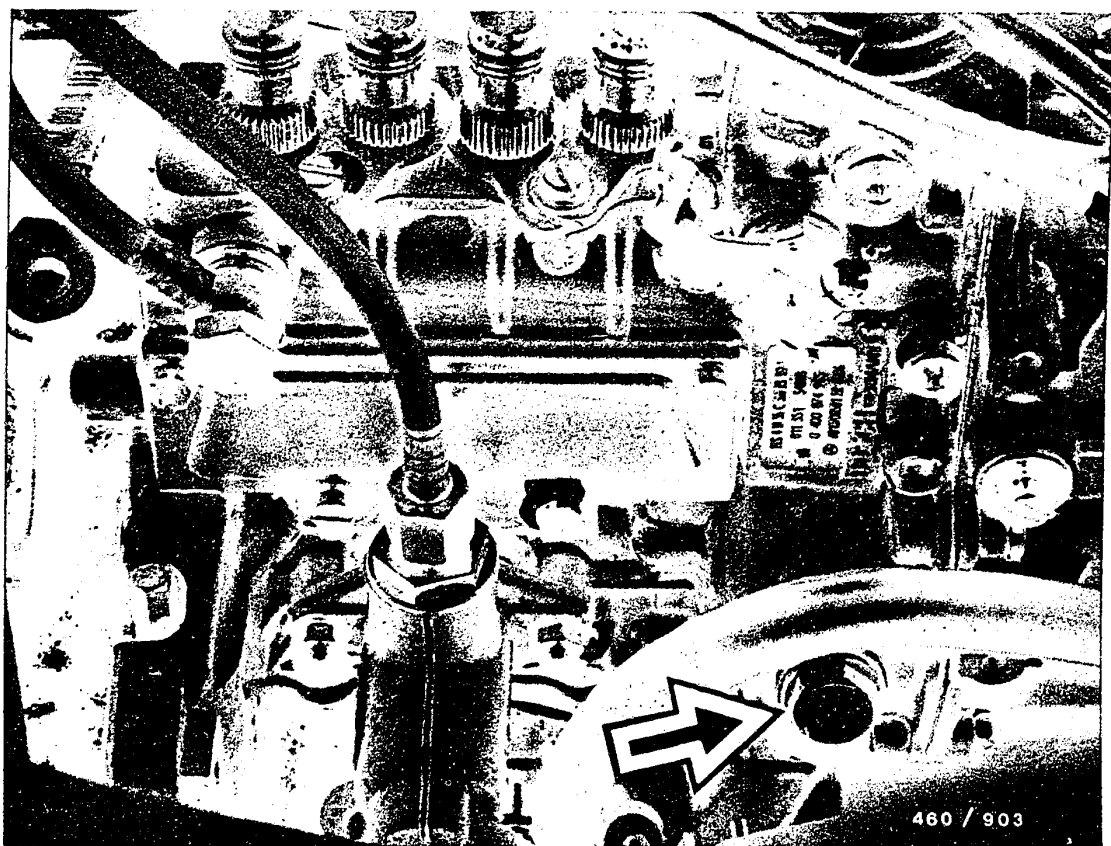


- 1 = Governor pulse generator, Daimler Benz part no.
617 589 102 100
- 2 = Diesel engine tester ETD 019.00, Bosch part no.
0 684 101 900
- 3 = Adapter line, Bosch part no. 1 684 463 147
- 4 = TDC sensor - engine (is installed)

33.2 Dynamic testing of start of delivery

33.2.1 Connection diagram for dynamic testing of start of delivery with diesel engine tester ETD 019.00



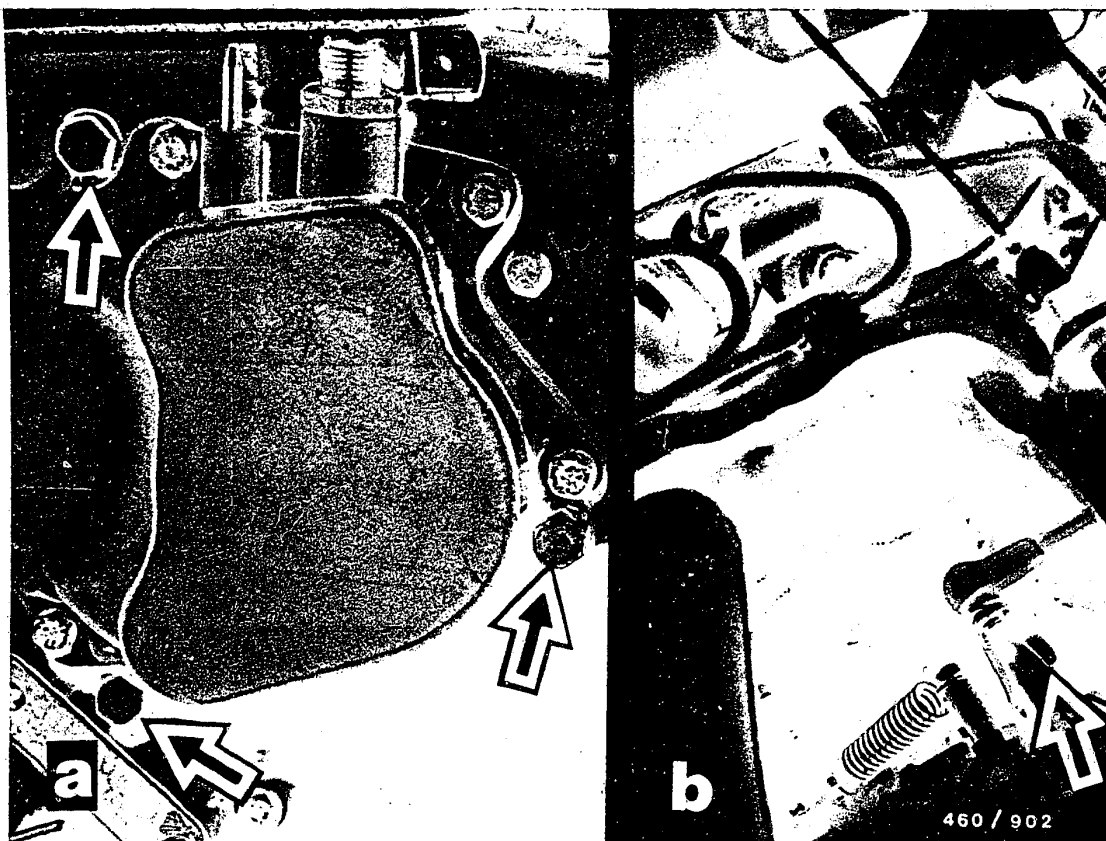


Remove screw plug (see picture, arrow) from governor.
 Screw in governor pulse generator.
 Mount TDC pickup on bracket (engine).
 Connect governor pulse generator and TDC pickup in
 accordance with connection diagram.
 Run engine at appropriate idle speed.

Idle speed, governed	Trimming-plug position
610 - 650	4

Read off governor pulse value on motortester or diesel
 engine tester.
 Should be: $15 \pm 1^\circ$ ATDC



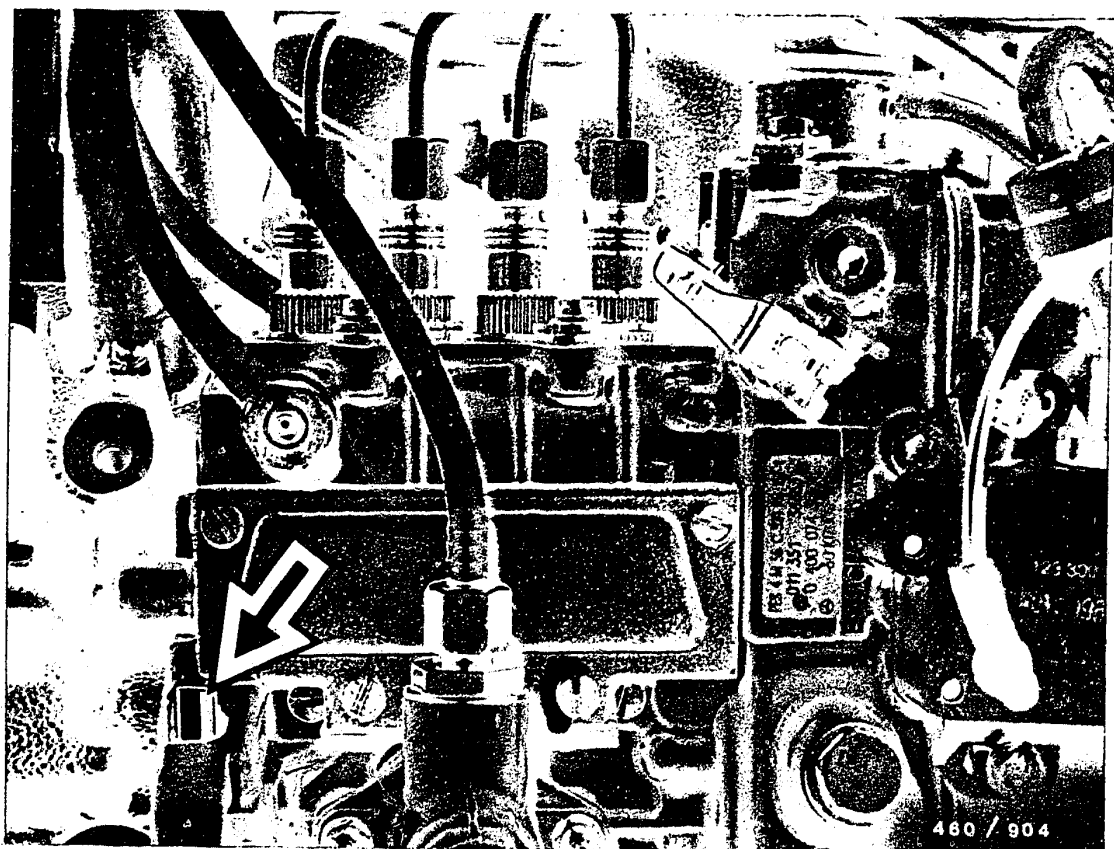


If set value not reached, injection pump must be turned.

Adjusting:

Loosen injection-pump fastening screws at drive end (arrow, picture a) and on support bracket (arrow, picture b).





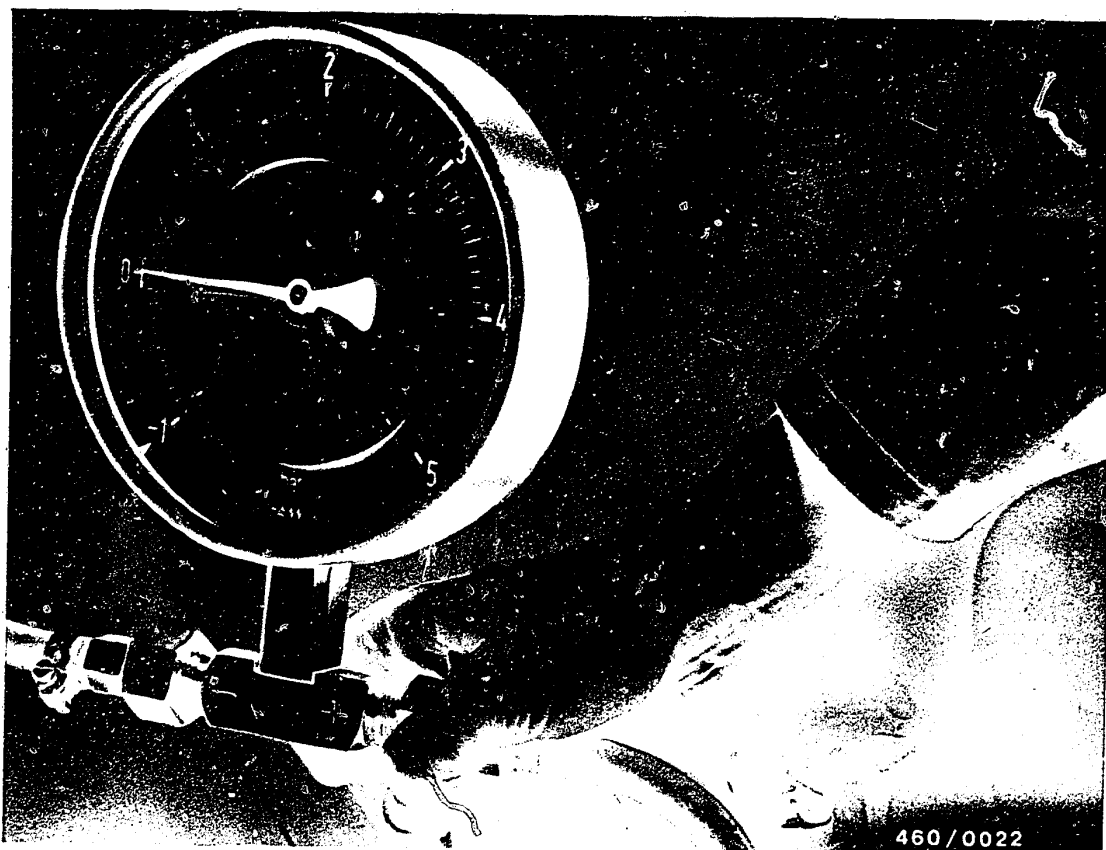
Run engine at appropriate idle speed.
 Set injection pump to set value - 15° ATDC by turning the adjusting screw (see picture, arrow).
 Turning the adjusting screw to the right = start of delivery comes later
 Turning the adjusting screw to the left = start of delivery comes earlier.

If the range of adjustment of the adjusting screw is not enough, relocate the injection pump.
 Stop engine. Disconnect tester. Screw screw plug with seal into governor again. Check engine oil level.

Checking and setting values

Idle speed, governed	Trimming-plug position
610 - 650	4





34. TESTING CHARGE-AIR PRESSURE

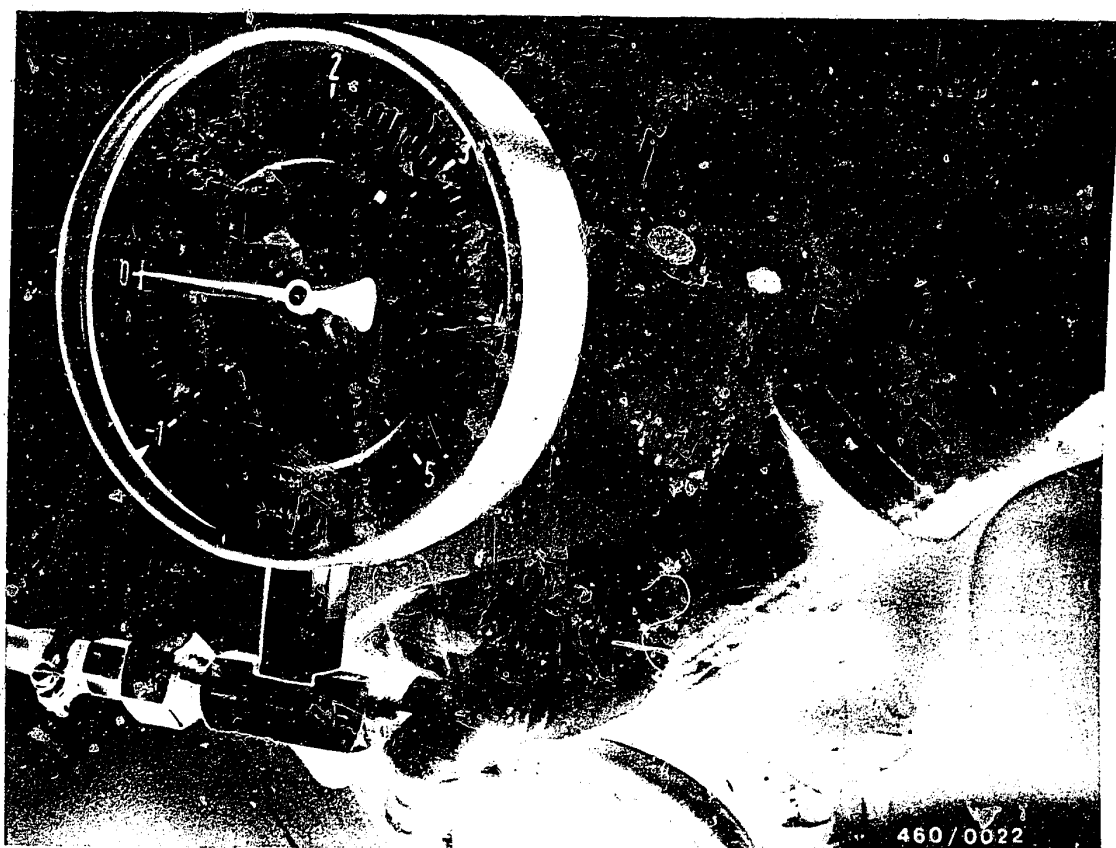
To test the charge-air pressure, it is possible to use the differential-pressure gauge.

Connect differential-pressure tester with the + side to the charge-air tube (to do this, use suitable fitting). Test-connection thread M 10 x 1.

Note:

To assess the exhaust turbo-supercharger, it is essential that the full-throttle check, maximum speed unloaded, start-of-delivery, injection pressure of the injection nozzles, and the mechanical condition of the engine are all correctly set or in proper working order.



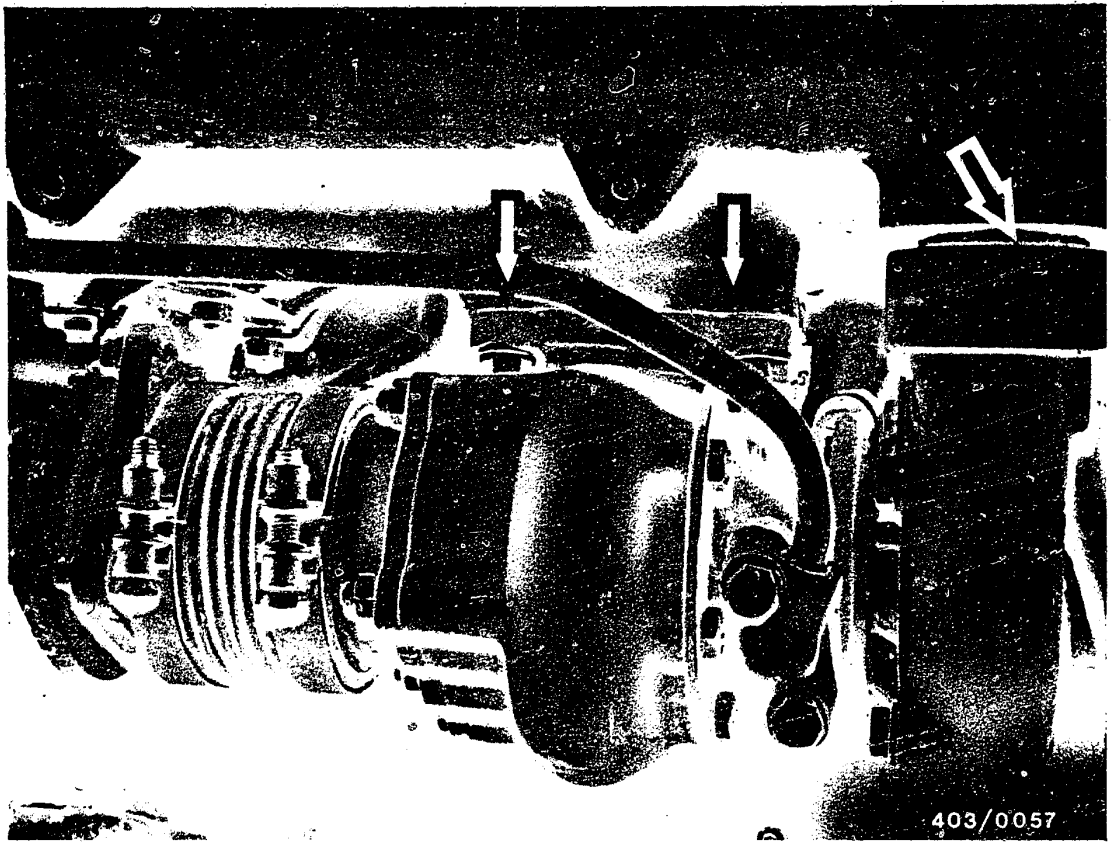


A charge-air-pressure test can be conducted only on a chassis dynamometer.

Run the vehicle on the chassis dynamometer in driving position "2" at full load and $n = 4000 \text{ min}^{-1}$.

During this test, the specified charge-air pressure of 0.75 ... 0.95 bar gauge pressure must be reached.





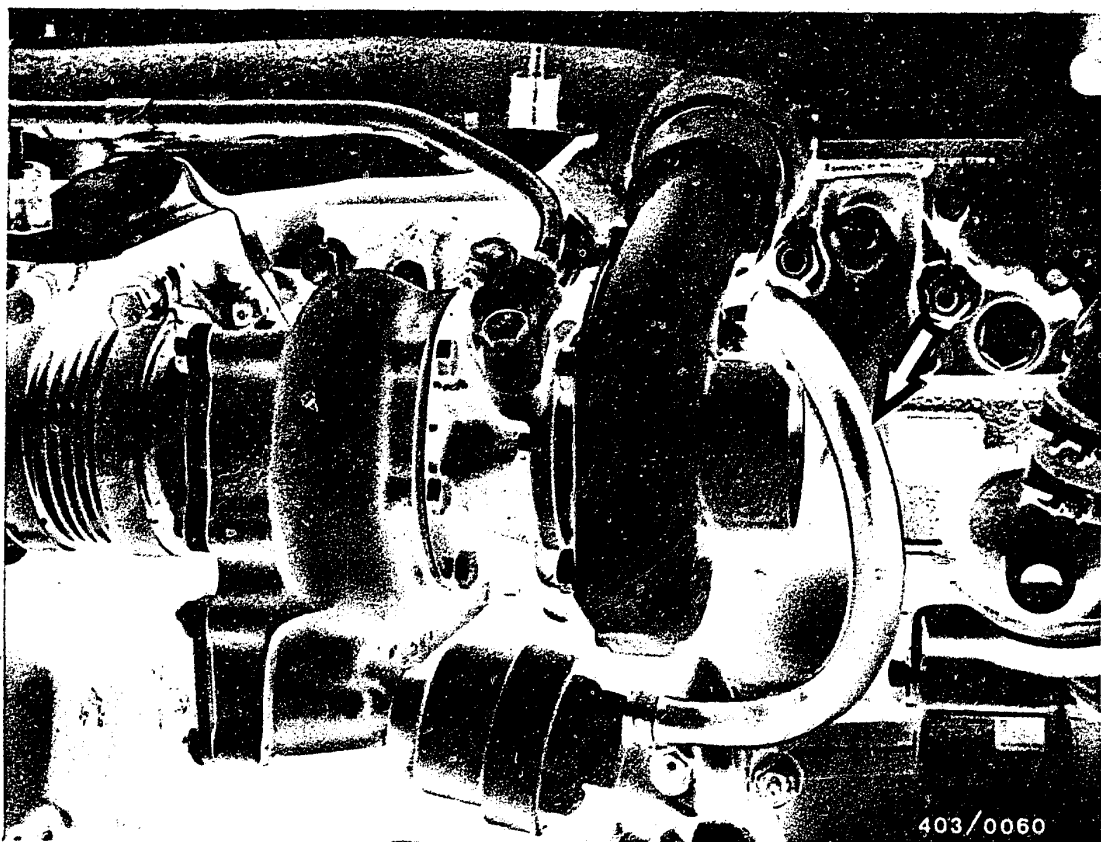
35.1 Testing turbo-supercharger for leakages (Illustration shows turbo-supercharger of 300 SD. - US version)

If there are any deviations (charge-air pressure too low), proceed as follows:

Clean air filter and test the air-intake scoop for throughflow.

- Check white pressure line in accordance with vacuum diagram.
- Check exhaust turbo-supercharger for leaks. Leaks may be found at the following locations:
 - Flange gasket between exhaust manifold and turbine inlet (a).
 - Gasket between compressor outlet and charge-air pipe (b).
 - Sealing shim between charge-air pipe and exhaust manifold (not visible in illustration).
 - Pressure line from charge-air pipe to ALDA unit (not visible in illustration).



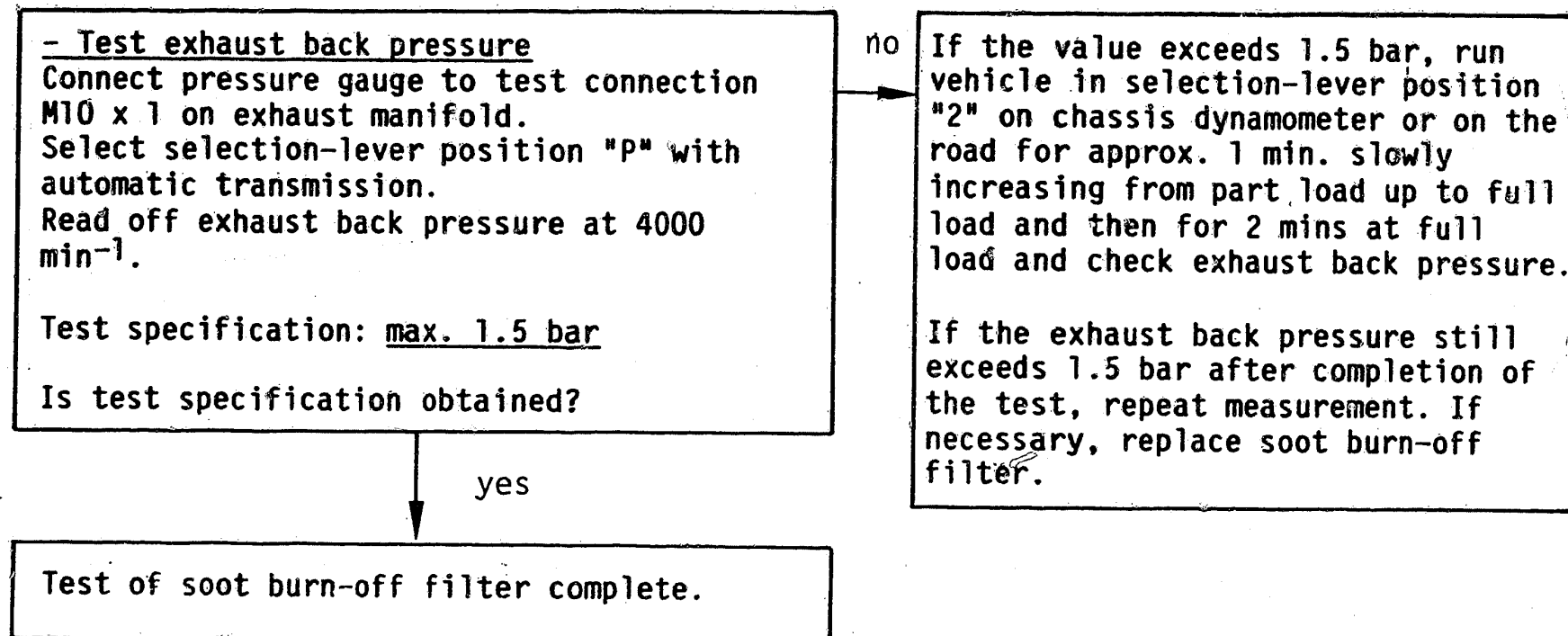


Test charge-air pressure. Set value: 0.75 ... 0.95 bar gauge pressure. If the charge-air pressure at full load exceeds 1.1 ± 0.15 bar gauge pressure, proceed as follows:

- Check connection hose from compressor housing to charge-air-pressure control valve (arrow). Eliminate leakages or replace kinked connection hose.
- If the connection hose is O.K. and the charge-air-pressure control valve does not open, replace the exhaust turbo-supercharger.



35. TESTING THE SOOT BURN-OFF FILTER



M3

Testing soot burn-off filter

MB 124/126



M4

Testing soot burn-off filter

MB 124/126



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